FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS

WILLIAMSBURG COUNTY SOUTH CAROLINA

Prepared Under Sponsorship of
WILLIAMSBURG COUNTY
WILLIAMSBURG COUNTY BOARD OF COMMISSIONERS
and
WILLIAMSBURG SOIL AND WATER CONSERVATION DISTRICT
In Cooperation With The
U. S. Department Of Agriculture
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HOW TO U TA" SHEETS

To find informatic eral Ditch Contained in this Drainage Feas s should be taken:

1. The approxin should be known.

2. Refer to fig TS" and locate the area on this map.

3. This index m e map sheet showing the drainage pla

4. Turn to the the area desired on this map. When t ow the "Planning Area Number" and, such as M-1, M-2, L-1, L-2, etc.

5. Turn to this planning area number in the ENGINEERING AND DESIGN DATA sheets and locate the main or lateral desired on this sheet.

Each time a lateral enters the main canal, the Main is broken into a section at this point. Laterals also are broken into sections at points where other laterals enter them. This was necessary to design each section to carry the flow increase. Also, it was necessary to break mains and laterals into sections at state and county road crossings in order to design the proper size culverts and bridges at these points.

It must be kept in mind that the information given in the "ENGINEERING AND DESIGN DATA" sheets begins at the upper end of each watershed and proceeds, section by section, to the outlet.

EXAMPLE: To find information for Hollimans Swamp where it is crossed by County Road No. 35, approximately two miles north of the community of Greeleyville, refer to Figure 3, "Index to Map Sheets." The index indicated that the point where Hollimans Swamp is crossed by the highway can be found on Sheet 5 of the maps at the back of the report.

Sheet 5 designates Hollimans Swamp as Main Canal No. 1, (M-1) of Planning Area Number 11. It also shows Lateral No. L-3 (L-3), to be the last lateral entering M-1 upstream from the highway crossing.

A general description of Planning Area Number 11 is found on page 12 of the report and the detailed Engineering and Design Data Table is on page 57.

Beginning at the upstream end of M-1 in the table for Area 11 on page 57, and proceeding downward toward its outlet end, it is found that M-1 is crossed by the highway 1500 feet downstream from the point where L-3 enters M-1. The various criteria for engineering and design may be obtained from the table at this line.

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Foreword

Since the first settlement was made in the Williamsburg Township in November 1732, the existing imperfect internal and surface drainage problem has retarded the growth and development of this area in South Carolina.

The higher areas of land were used by the first settlers for homesteads and for small fields to produce food crops. Low, wet lands were left in their natural state. As settlements grew and more land was needed for farming operations, it was necessary to install some type of drainage system on individual farms. These drainage systems were usually excavated by hand, many with slave labor. As a result, these small ditches were inadequate and only partially met the drainage needs. The lack of knowledge about drainage systems and the absence of the necessary construction equipment prohibited the design and installation of complete systems. Improving the quantity and quality of agricultural crops and providing well drained areas for home sites are essential to perpetuate economic growth of Williamsburg County. Providing additional drainage is necessary as a first step toward enhancing the environment and increasing income for the people of Williamsburg County.

With the increase in land use and particularly with the advent of modern construction machinery such as the bulldozer, dragline and backhoe, it became relatively easy to excavate larger canals and outlet ditches needed for adequate drainage. With use of these machines, a number of ditches have been excavated in recent years in scattered locations over the county.

The Feasibility Study of Requirements for Main Drainage Canals in Williamsburg County is the direct result of foresight and interest of the county authorities and the Williamsburg Soil and Water Conservation District Commissioners who saw the need of such a plan to enhance the potential development of the county. Agencies at all levels of government - local, county, state and federal - as well as private enterprise and numerous individuals, cooperated in the development of the plan. The Williamsburg County delegation appropriated funds for the local share of the cost of the plans including the publication of this report. Technical assistance was furnished by the Soil Conservation Service.

The plan will provide a firm basis for action by county officials in determining needed legislation and methods of financing the necessary drainage improvements as well as establishing priorities of work. The cooperation of other agencies, groups and individuals in the use of the plan also will be encouraged.

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FEASIBILITY STUDY
OF REQUIREMENTS FOR MAIN DRAINAGE CANALS
WILLIAMSBURG COUNTY, SOUTH CAROLINA

Introduction and Scope

The first logical step in solving the drainage problem in Williamsburg County is a feasibility study of the need and requirements for main drainage canals and ditches to remove the excess water. The purpose of the study is to point out the extent and severity of the drainage problem and to furnish a guide to determine the physical feasibility and the estimated costs of the needed improvements. To accomplish this, a preliminary design for a system of main drainage canals for the major watersheds of the county was made and is included in this report.

The data in this report is based on reconnaissance surveys, information presently available, and knowledge gained by long experience in planning and establishing drainage facilities in the county. The data is adequate for determining preliminary design and cost estimates, but is not adequate for the preparation of final construction plans, designs and costs. The data and references included can be used by engineers as guides to determine types of surveys and investigations needed for final design.

The use of most of the land in Williamsburg County is highly dependent on adequate drainage. The poor natural drainage is the principal detriment to the development of the land resources of the county. It results in frequent and costly crop damage on agricultural land, damage to property and disruption of facilities, both public and private, in urban and industrial areas. In recent years, poor natural drainage of soils has virtually prevented or deterred housing development progress where septic tank drain fields were to be installed. The need to reduce flooding through improvement of drainage canals is recognized as a problem of first priority.

Signing the agreement.

PROJECT SPONSORS- Representing sponsoring organizations, the above signed the Agreement for the development of the Feasibility Study of Requirements for Main Drainage Canals in Williamsburg County. L to R: C. M. Brown, Acting Chairman, Williamsburg Soil & Water Conservation District; J. Hugh McCutchen, Chairman of Williamsburg County Board of Commissioners; A. T. Chalk, State Conservationist, Soil Conservation Service; J.Henry Stuckey, State Senator, Williamsburg County.

PUBLICATION AUTHORITY - The publication was authorized by those pictured above: L to R: Frank H. McGill, Representative, Williamsburg County; LaNue Floyd, State Senator, Williamsburg County; J. Victor Rowell, Representative, Williamsburg County.

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Factors Affecting Drainage

The location of Williamsburg County, just inland from the Atlantic Seaboard, along with the county's physical features result in complex drainage problems. The physical features that contribute to these problems are topography, rivers, rainfall, soils and land use changes, all of which are inter-related. The following is a brief discussion of how these physical features affect the drainage, along with a description of the existing drainage system and its maintenance.

Topography

Topography is a severely limiting factor affecting drainage, since the county is located on a marine terrace of the lower coastal plain. The land is generally level with slight undulations in some sections of the county, however, the removal of excess water is restricted in most sections due to inadequate outlets. The natural drains, other than the rivers, are broad, have flat grades and are heavily vegetated. In their present state, little or no channel exists, causing extreme flooding in depressed areas. An exception to this is the old Kingstree Drainage District canal system excavated about forty years ago. Some of these old ditches still carry a large amount of water but are in need of varying amounts of maintenance to restore them to full capacity.

A costly crop loss – "flopped" tobacco – was caused by lack of proper drainage in an agricultural area.

Rivers

There are several large rivers and streams in the county that have a significant effect on the drainage pattern. The Santee River on the South, the Black River through the midsection, Black Mingo Creek in the northeastern section, and the Great Pee Dee River all play an indirect part in the county's drainage. The main rivers are well defined; their water levels are generally at lower elevations and provide an outlet for higher ground drainage. However, these rivers and creeks are constantly a threat to adjacent low lying areas and after heavy rainfall periods the flood water from the rivers flood low lying areas and block outlets of tributaries. A sizeable area of the county is affected in this manner. This report does not include any study of the main streams; it does include the feasibility of improvements in the tributaries to relieve adjacent lands of flooding as quickly as possible after heavy rains when river floods recede.

Damage to the parking area and vegetation in a rural church yard was caused by flooding from an inadequate drainage canal nearby.

Rainfall

U. S. Weather Bureau records, Table No. 1, show monthly and annual totals of rainfall for Kingstree and vicinity. The average annual rainfall of 48.45 inches would not cause a serious drainage problem if it were evenly distributed. The most serious drainage problems occur in low flat areas which are flooded by high intensity, short duration rain storms. During periods of excessive rainfall many unimproved and paved roads are impassable because of floods.

The design of drainage systems and supporting structures is related to the amount of runoff that can be expected from storms of differing intensities and durations. (See Table Nos. 2 & 3.)

Soils

Soils have characteristics which decidedly influence the need for, and the degree of,drainage. Some of the more important characteristics are depth, infiltration, permeability, texture, structure, water-holding capacity, water-table depth and slope. A knowledge of these characteristics and of the engineering properties of soils is essential in planning, designing and installing an adequate drainage system. Fine (clayey) textured soils have little or no sub-surface water movement and can be drained only through removal of surface water by means of shallow surface ditches. Sandy soils, having high or fluctuating water tables, respond readily to sub-surface drainage but present problems in the design of open ditches.

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TABLE NO. I

TOTAL INCHES OF PRECIPITATION

KINGSTREE, SOUTH CAROLINA

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1935	1.92	1.76	1.94	2.85	1.87	2.13	7.39	9.07	5.30	0.22	2.84	2.25	39.54
1936	3.83	4.01	5.91	6.22	0.35	6.12	6.79	2.99	2.00	5.56	0.94	4.15	48.87
1937	3.72	4.57	1.99	5.65	1.86	3.11	5.99	5.60	5.90	2.51	3.56	2.61	47.07
1938	1.20	0.84	3.48	5.91	3.43	5.90	6.51	2.69	5.88	0.99	1.62	1.71	40.16
1939	2.30	6.31	2.86	2.50	2.42	4.92	5.26	8.24	1.42	1.37	1.12	2.05	40.77
1940	2.65	4.97	3.30	2.50	2.80	2.55	3.12	8.82	2.29	0.05	1.61	2.46	37.12
1941	1.86	1.96	6.53	6.66	0.38	11.72	5.78	4.79	1.99	1.58	0.80	10.01	54.06
1942	1.62	3.61	6.92	0.60	2.71	5.73	3.96	6.63	1.75	0.66	1.24	3.96	39.39
1943	4.20	1.59	5.99	3.19	2.61	4.05	6.87	3.48	2.00	0.00	2.97	3.31	40.26
1944	4.21	5.09	7.94	3.02	1.10	1.25	4.91	3.85	3.91	5.19	1.30	1.16	42.93
1945	1.78	3.42	2.07	2.51	3.96	5.19	7.18	7.36	18.01	2.31	1.20	7.51	62.50
1946	3.65	2.08	2.85	3.29	2.22	2.74	5.94	7.65	3.84	6.35	2.05	0.52	44.29
1947	3.20	0.16	5.22	5.11	4.04	4.99	10.24	11.96	3.95	2.76	5.23	5.23	62.09
1948	2.85	4.38	6.13	3.12	6.74	2.05	6.99	3.36	5.76	2.90	10.20	4.26	58.74
1949	0.68	5.29	1.90	2.85	1.52	9.11	3.65	8.83	2.81	1.41	2.90	1.41	42.36
1950	1.25	0.83	4.28	0.72	3.73	3.26	6.42	4.86	9.72	3.67	1.15	4.05	43.94
1951	0.73	0.93	3.99	3.61	0.71	4.57	6.82	3.74	2.76	0.22	2.86	3.26	34.20
1952	1.42	5.46	4.88	1.70	4.22	1.18	3.56	8.46	3.09	0.80	1.82	2.45	39.04
1953	2.45	5.81	5.85	0.80	3.44	3.83	2.47	9.03	4.87	0.16	3.16	6.71	48.58
1954	1.94	0.57	2.54	2.43	4.00	2.19	5.13	2.90	4.19	5.93	0.70	1.90	34.42
1955	4.58	1.71	2.81	5.18	4.64	5.21	10.39	7.05	10.51	2.29	2.32	0.92	57.61
1956	2.11	6.01	3.41	2.69	6.29	0.97	3.55	8.47	9.12	2.78	0.45	1.55	47.40
1957	1.89	2.69	4.68	1.72	6.87	3.59	6.79	4.92	4.44	0.56	5.08	3.22	46.45
1958	5.70	3.93	5.22	8.08	3.51	6.00	4.45	10.53	4.89	2.31	1.25	3.40	59.27
1959	2.93	6.25	6.01	2.55	1.34	3.65	7.38	9.66	9.09	7.81	1.35	3.83	61.85
1960	4.65	5.41	6.50	2.14	1.94	7.09	6.83	5.98	6.91	1.41	1.32	1.46	51.64
1961	1.76	5.40	2.86	9.30	3.54	4.88	6.25	7.29	3.36	0.80	2.98	1.84	50.26
1962	4.93	4.57	5.87	2.46	0.87	5.11	3.80	10.13	5.26	1.02	4.62	2.93	51.48
1963	4.66	3.46	1.09	1.25	2.50	5.53	6.09	4.78	5.77	0.41	4.77	1.74	42.05
1964	7.16	7.32	3.41	3.42	3.35	5.59	10.26	11.89	3.30	11.65	0.78	4.16	72.29
1965	1.26	6.40	9.11	3.12	5.94	9.06	6.03	6.28	1.21	1.92	1.14	1.10	52.57
1966	5.86	2.99	4.57	2.07	11.39	6.55	5.49	5.51	2.51	1.98	0.87	3.32	53.11
1967	5.55	3.23	2.40	2.45	3.88	6.08	5.99	6.47	3.19	1.05	2.25	3.49	46.03
1968	3.35	1.17	2.29	3.09	3.41	6.89	6.24	3.72	2.56	11.20	2.60	3.39	49.91
1969	2.05	3.75	4.27	3.79	3.58	11.17	1.40	12.56	2.48	2.26	3.20	3.29	53.80
1970	3.64	4.11	8.49	0.87	2.27	2.43	5.18	6.53	4.95	4.48	0.83	4.26	48.04
Average Rainfall	3.04	3.67	4.43	3.32	3.32	4.90	5.86	6.84	4.75	2.74	2.36	3.19	48.45

from: Rainfall Data, U. S. Weather Bureau
Kingstree, S. C. Station

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TABLE 2

PRECIPITATION EXTREMES (1935-1970)

	Maximum Monthly	Year	Minimum Monthly	Year
January	7.16	1964	0.68	1949
February	7.32	1964	0.16	1947
March	9.11	1965	1.09	1963
April	9.30	1961	0.60	1942
May	11.39	1966	0.35	1936
June	11.72	1941	0.97	1956
July	10.39	1955	1.40	1969
August	12.56	1969	2.69	1938
September	18.01	1945	1.21	1965
October	11.65	1964	0.00	1943
November	10.20	1948	0.45	1956
December	10.01	1941	0.52	1946

From Rainfall Data, U. S. Weather Bureau, Kingstree, S. C. Station

TABLE 3

RAINFALL IN INCHES FOR SELECTED DURATIONS

WILLIAMSBURG COUNTY, SOUTH CAROLINA

	30 Min.	1 Hour	2 Hour	3 Hour	6 Hour	12 Hour	24 Hour
1 Year	1.3	1.7	2.0	2.2	2.5	2.9	3.4
2 Years	1.6	1.9	2.3	2.6	3.0	3.5	4.2
5 Years	1.9	2.4	3.0	3.3	3.9	4.6	5.4
10 Years	2.2	2.8	3.5	3.8	4.6	5.4	6.3
25 Years	2.5	3.2	4.0	4.4	5.1	6.3	7.2
50 Years	2.8	3.6	4.4	4.9	5.9	6.9	8.1
100 Years	3.1	3.9	4.9	5.4	6.5	7.9	9.2

From U. S. Weather Bureau Technical Paper No. 40 - "Rainfall Frequency Atlas of the United States".

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These problems include: (a) sloughing of side slopes which restricts depth of cuts; (b) limitation of the velocity of flow; and (c) sedimentation.

Residential property damage results from heavy rains and poor drainage facilities.

Damage to stores is caused by flooding of a main street business section in Kingstree, S. C.

Land Use Changes

Several changes in land use in recent years have had an adverse effect on drainage in the county. One of the most significant of these is urbanization. Areas being developed for housing, shopping centers and industry in most instances have inadequate drainage facilities. The drainage facilities now in use were established to handle the agricultural needs of the area. They are not adequate to handle runoff resulting from urbanization. Roof tops, paved roads, parking areas and compaction in combination with raised water tables resulting from septic tank drain field installation, grading of large areas and elimination of some ditches during urban development, all have created conditions approaching 100 percent runoff. As urbanization continues, the present drainage facilities will become increasingly inadequate to handle the runoff.

There is a need for regulations to insure that adequate drainage canals and drainage structures are installed as these areas are developed.

Drainage structures in driveways paralleling streets and roads in new as well as established sub-divisions are critical factors contributing to poor local drainage. Head losses alone, resulting from widespread use of under-designed culverts in residential areas, create local flooding conditions.

Culverts for road and railroad drainage generally lack capacity to handle runoff from high intensity storms and are frequently installed with invert elevations too high to drain low areas. They are serious bottlenecks to the rapid disposal of runoff and cause local flooding. Culverts are predominantly inadequate on unpaved and farm roads.

Existing Drainage System

With the exception of some recently excavated canals, drainage systems in rural and urban areas are generally inadequate in depth and capacity and have very flat grades. Existing flat grades are the result of topography (extensive flat terrain) and also the result of discharging canals into swamps or bays which are not adequate outlets in their present state since they generally pond water for long periods of time following heavy rainfall.

An important additional factor contributing to insufficient depth and capacity is the lack of securing adequate rights-of-way for proper ditch design, spoil management, and access for maintenance. Rights-of-way, in the past, were usually limited to the width which the landowner was willing to donate; in most cases this was less than 30 feet.

Existing canals are usually located in natural water courses. However, in many instances, alignment is poor due to the fact that canals were located on existing property lines, cleared land borders, meandering branch runs or other physical features that were inconsistent with good channel flow conditions.

Maintenance

Lack of adequate maintenance is a factor affecting the capacity of drainage canals and ditches. Most of the existing drainage canals in the county were dug by hand many years ago; some were dug or enlarged by the Works Progress Administration (WPA) in the 1930's; clumsy floating dredges were used on some of the larger ones. These methods left nearly vertical side slopes with spoil placed immediately next to the ditch. Access to practically all canals is restricted by high spoil banks which are covered by a heavy growth of trees and brush. These spoil banks, being continuous for long distances, prevent surface drainage from adjacent areas; this results in ponding behind

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the banks. The extent of economic and practical maintenance by machine is very limited, at present, due to these conditions and also to the obstacle of obtaining easements, private and legal, permitting access.

Part of soybean crop is lost as result of wet spots in a field needing sub–surface drainage.

Drainage Principles

The purpose of this report is to present a plan for the location and needed capacity of main drainage canals. This is, however, only the first step in the establishment of a complete drainage system. Drainage systems are divided into two broad categories - surface drainage and sub-surface drainage.

Surface Drainage

Surface drainage removes excess water by gravity flow from the land surface. A very important functional part of the drainage system is the provision for water movement along the surface to an outlet, without ponding. Surface water can best be moved by shallow graded channels or by forming the land surface to a uniform slope, primarily on cultivated land. Surface drainage facilities are particularly applicable to soils having slow permeability rates; surface drainage on these soils is used to prevent ponding in shallow depression areas and also to divert water from protected areas by collecting and conveying water to natural or excavated channels.

Sub-surface Drainage

Sub-surface drainage removes water from beneath the surface of the soil by facilities which create a difference in hydraulic head thus resulting in the movement of water through the soil to an outlet at a lower elevation. This may be accomplished by open ditch drains or by tile drains. Open ditch drains have an added advantage in that they can also collect and remove surface water as well as sub-surface water. Tile drains require very little maintenance, and, with certain precautions,can remove surface water indirectly by providing protected drop inlets or catch basins that simulate small storm sewer systems.

The purpose of sub-surface drainage is to lower the water table to a point where it will not interfere with plant growth or the use of the land for residential or other purposes. The minimum depth below the surface at which water tables should be maintained depends on the purpose for which the land is to be used.Water tables, fluctuating from a lower level upward to or near the surface, may not be as great a problem in agricultural areas as they would be in populated areas.

Installation of clay or plastic drain tile is one method of sub–surface drainage in agricultural land.

The Drainage System

A drainage system is composed of three parts: the collection segment, the disposal segment and the outlet.

The collection segment is that part of the drainage system which first picks up water from the land. It may consist of shallow trapezoidal ditches having flat side slopes, V or W type ditches, bedding,or graded land surfaces in urban areas. This is the part of the drainage system which cannot be neglected if the system is to perform adequately.

The disposal segment receives water from the collection segment and conveys it, usually in an open channel, to the outlet. Generally, this report concerns itself with the disposal segment of the drainage system.

The outlet is the end point of any section of a drainage system beyond which the ditch,storm sewer, or the system no longer guides or controls the water it discharges.

Drainage Requirements

The drainage system should be designed so that flooding will not occur in critical parts of the watershed for a period of time sufficient to cause damage or disrupt utilities and services. For urban areas, design should

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provide for the removal of runoff from the design storm with a minimum of flooding. In agricultural areas, the degree of protection required by crops varies considerably, depending on their tolerance to the amount and duration of excess water. Truck crops are the most susceptible to damage from excess surface water, with damage occurring to some when flooded for the relatively short period of 24 hours or less. General crops such as corn and grain are less susceptible, with pasture being the least subject to water damage. Woodland areas are the least subject to damage from flooding for prolonged periods.

Poorly drained soils adversely affect the use of the land for most purposes. On agricultural land, high water tables restrict root depth; the soil temperature is lowered and air circulation is severely limited depending on the degree of soil saturation. Wet spots in the field delay farm operations and shorten the growing season.

In residential areas, poorly drained soils adversely affect the construction, maintenance and use of roads and streets in addition to the harmful effects on ornamental plants, flower gardens and lawns. These soils also limit or prohibit the development of some areas, preventing the proper functioning of septic tanks, tile field drains and thus contribute to health hazards.

Flooded road to a house necessitated this means of transportation; crops were lost due to poor drainage.

Design Criteria

Since the design of drainage systems and supporting structures is based on Hydrology and Hydraulics, this report will limit itself to the application of these sciences as they apply to the solution of such problems. Data and more detailed information on the design of open channels, closed conduits, culverts and other engineering structures ultimately involved in establishing the drainage system are tabulated on the pages following this narrative section.

Drainage Coefficients

The drainage coefficient is the rate of removal of runoff to provide a specific degree of drainage protection to an area. Land use, soils, topography and rainfall intensities and duration determine the selection of drainage coefficients.

Three curves have been developed from which required drainage capacities of open ditches were computed, dependent on the land use. (See Figure No. 1)

The highest curve is for urban use followed in descending order by the curve for crops and the curve for woodland.

The use of these curves provides for the removal, in 24 hours time, of the following amounts of runoff:

Urban curve	- 4.39 inches
General crops curve	- 1.67 inches
Woodland curve	- 0.37 inches

The curve for urban areas reflects an approximate peak runoff for a 10-year frequency rain.

A ditch with good cross section and spoil management serves as surface and subsurface drainage outlet for a number of landowners.

Velocity

The maximum safe velocity in an open channel is determined based on soil characteristics, the shape of the channel, and available means for the stabilization of the soil after construction. The optimum velocity for channels, based on soil conditions in Williamsburg County, is approximately 2 feet per second. The soils are predominantly sandy loams with sandy clay subsoils. There are some areas where sands occur, therefore the design of channels in these lighter soils must consider the need for checking erosion and bank sloughing that might occur, immediately following construction,when water tables are high.

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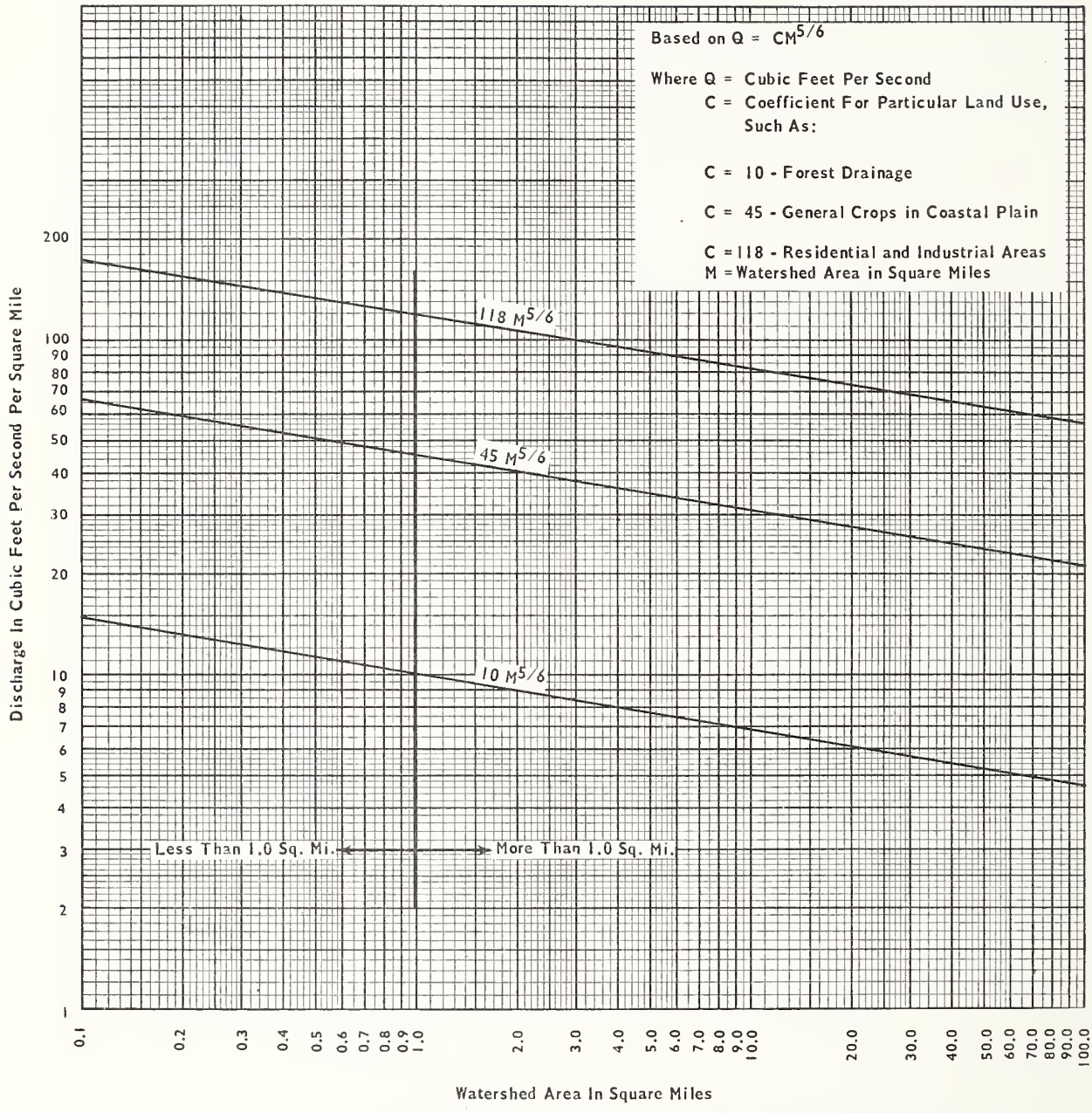

Figure No. 1 - Drainage Coefficient Curves

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Velocities were computed by use of Manning's formula:

$$V = \frac{1.486}{n} \times r^{2/3} \times s^{1/2}$$

Where: n = roughness coefficient
r = hydraulic radius
s = slope in feet per foot along the ditch

The proper design of a ditch cross section requires the selection of the proper value of "n". The following tabulations were used for selection of these values in the design of main canals with good alignment:

Hydraulic Radius*	"n"
Less than 2.5	.045
2.5 to 4.0	.040
4.0 to 5.0	.035
Over 5.0	.030

* The hydraulic radius is obtained by dividing the proposed area of the channel cross section by its wetted perimeter.

Roughness coefficients were selected anticipating flow retardance features, vegetative growth and sedimentation, several years after construction. Newly dug channels with lower selected roughness coefficients will have higher velocities initially. These velocities will diminish as the flow retardance features increase the first few years.

A small road culvert, placed high, seriously hinders removal of rainfall runoff.

Channel Cross Section

Depth and width of the channel are both significant considerations in design. The channel must be deep enough to intercept ground water and allow for safe disposal. The channel depth must be adequate for lateral ditches and tile drains. Other things considered to favor deeper channels with resulting narrower bottom widths are: less right-of-way is required, vegetative growth on the wetted perimeter is reduced, and conditions are less favorable for the formation of sandbars. A channel approximately as deep as its bottom width - within practical and economical limits - will remain effective for a longer period because it has most favorable hydraulic characteristics.

A minimum bottom width of 3.0 feet was designed for main channels, which conforms to a bucket width of small dragline excavating equipment commonly available; bottom widths were selected as narrow as design and construction criteria would permit to maintain a favorable hydraulic section.

Side slopes of the ditch, as well as depth and allowable velocities, are determined primarily by topography, soil conditions, proposed maintenance methods, and a need for adequate rights-of-way. To satisfy these conditions, 1 to 1 side slopes were used for main channels in this report. Further detailed soil surveys may indicate subsoils that would allow ½ to 1 side slopes in many areas; this side slope has been used satisfactorily in numerous cases in the county.

In fine sands, or other unstable soils, having high water tables, sloughing of side slopes may be expected immediately after excavation. Sloughing will continue until the water table becomes established at the lower level. The problem can be controlled somewhat in wide channels by utilizing in the initial stages, a pilot channel to lower the water table, followed by final construction when the slopes have become more stabilized. If the pilot channel method is not used, a maintenance operation would be required soon after the slopes have been stabilized to restore the design cross section.

A large road culvert at low elevation provides good drainage capacity.

Culverts and Bridges

Culverts generally restrict the flow of water in ditches by decreasing the flow area thereby causing a loss in hydraulic head. This was considered in designing main channels. At culverts, during design flow, the hydraulic

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gradient,in most cases, was set low enough to keep the profile of the water surface well within the channel cross section in all critical areas.

The sizes of concrete pipes shown in the tables in this report were selected to pass, adequately, the expected runoff flow which the ditches were designed to carry.

To provide unrestricted flow, a bridge over a new canal replaces the small pipe previously used to drain heavy rainfall runoff.

The culvert sizes were determined from Hydraulic charts for the Selection of Highway Culverts (U. S. Department of Commerce, Bureau of Public Roads) and are adequate for culverts flowing with either inlet or outlet control conditions. A head loss of no more than 0.5 foot was used in the size selection from the charts.

The sizes of culverts shown are also equivalent to calculated sizes based on a modified Talbot's formula.

Talbot's formula is:

$$A = C\sqrt[4]{M^3}$$

Where: A = Necessary waterway area in sq. ft.
M = Area drained, in acres
C = Runoff coefficient

This formula, based on a maximum rainfall of 4 inches per hour, was modified to use a proportionate 1.67 inches per hour and a runoff coefficient C = .25.

In cases where additional culvert cross section area was needed to supplement ones already in place, the total area of culvert opening, required to pass the flow was determined by use of this modified formula.

Where culvert sizes exceed 60 inches in diameter, it was usually found more economical to use a 15-foot bridge.

Right-of-way Requirement-Spoil Bank Management

Factors governing width of rights-of-way can best be understood by consulting Figure No. 2. The principal requirements for spoil bank management includes a right-of-way wide enough for placement and shaping of spoil into a roadway to provide a way for travel by maintenance equipment. No berm widths are needed where the spoil is to be spread and shaped to establish a roadway on top of it. A berm width of 15 feet is optimum where spoil is to be stacked and not shaped.

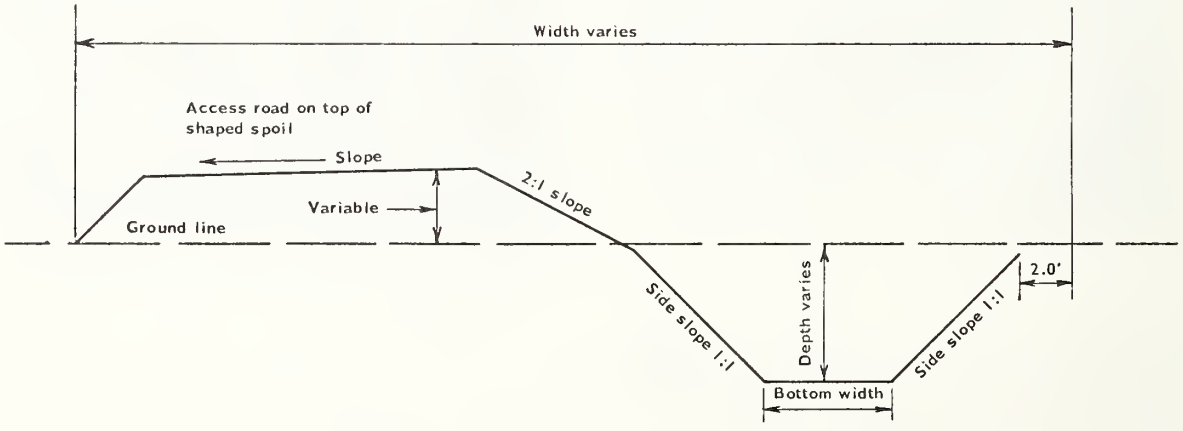

Figure No. 2 - Typical Main Ditch Cross-Section Showing Basis For Determining Right-Of-Way Width

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Description of Areas

To facilitate planning, the county was divided into 11 areas, generally along watershed divides or large drainageways regarded as adequate. This delineation allowed the study to be made of the present drainage system and its needs peculiar to each area. A brief description of each area and the features having some influence on the study of its drainage problems follows:

Area 1 - Hemingway - Union Crossroads - Outland

Area 1 is located in the northeastern corner of Williamsburg County. The Great Pee Dee River runs along the northeastern border and Black Mingo Creek is on the southwestern border. These water courses provide the two major outlets for other drainageways in this area with about half of the watershed draining to each.

Most of the section between these two drainage outlets is nearly level and composed of soils described as deep and ranging from well drained to poorly drained. These soils respond to subsurface drainage very well and give good yields in tobacco, corn and soybeans grown in this area.

The town of Hemingway is located in the upper center of the area and growing residential and industrial interests around it have affected the amount of drainage runoff. This is reflected in the Engineering and Design Data for the watershed in this vicinity.

Area 2 - Indiantown - Stuckey - New Morrisville

This area is a long, generally rectangular section, running north and south with Black Mingo Creek across its midsection. The creek provides the outlet for other tributaries that drain primarily a farming section in the upper half composed of level to slightly undulating land. The soils are deep and moderately well-drained to poorly drained. Subsurface drainage ditches give good results in increased yields of the tobacco, corn and soybeans.

The lower half of this area is comprised primarily of flat bays which contain wet sandy soils that are somewhat poorly drained to very poorly drained. The bays are relatively undeveloped and are mostly covered with hardwood and other swampy areas with some timber producing land. Due to its nearly level topography, drainage of this section is difficult to obtain. Wildlife is more abundant.

Area 3 - Nesmith - Rhems - Warsaw

Area 3, located in the eastern central section of the county, is a small area bordered on the north by Black Mingo Creek and on the south by the Black River. These two streams provide outlets for the upper and lower farming segments while the mid-section is composed of flat bay areas which overflow periodically in small streams in several directions.

The soils in the area are nearly level, ranging from well drained to poorly drained; subsurface drainage ditches are very effective. The mid-section is covered largely by undeveloped timberland with abundant wildlife. Timber companies are developing new tree plantations in the central section of this area. Drainage patterns will influence this development.

Area 4 - Cades - Roper Crossroads - Cedar Swamp

This area located in the north central section of the county is bordered on the north by Lake Swamp. It is covered by a network of swampy drainageways either running to Lake Swamp or converging into the upper reaches of Black Mingo Creek to the east.

The soils are deep and nearly level, ranging from well drained to poorly drained. They respond well to subsurface drainage and produce good general crop yields. The swamps and timberland provide much wildlife in this area and large acreages are leased for hunting rights.

Area 5 - Millwood - Trio - Sutton's

Area 5 is a long narrow area extending south from the center of the county across Black River and is bordered on the south by the Santee River. The Black River, passing through the upper portion, provides the natural outlet for tributaries in more than half of this area. The Santee River is the outlet for the southernmost portion.

This area has lesser improved drainageways than the planning areas north of the Black River. It has numerous old plantations with large tracts of timberland on which hunting rights are leased.

The major portion of the soils in the area are comprised of relatively thin topsoils with clay subsoils. They can be described as nearly level and most are poorly drained. The better farm fields produce fair general crops and pasture.

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Area 6 - Bloomingvale - Earle - Wee Tee

This area is very similar to Area 5 in its physical characteristics. Located in the southernmost corner of the county, it is crossed in the upper section by the Black River and bordered on the south by the Santee River. There are several large bay areas in the midsection. Area 6 is old plantation country and large tracts are leased for quail and deer hunting.

The soils are nearly level and poorly drained. The bay area soils are very poorly drained. Good general crops are produced on farmlands along both sides of the river in the upper portion of this area.

Area 7 - Kingstree - Cades - Moores

Area 7, located in the northwestern corner of the county, is comprised almost totally of the Kingstree Swamp Watershed, which outlets into the Black River at Kingstree. A large part of Kingstree Swamp was improved in the early twenties by the old Kingstree Swamp District drainage canal. To some degree, these old ditches are still effective; some need maintenance to restore their full capacity.

There are several poorly drained bays scattered over the area. The soils in the farming sections respond well to subsurface drainage and, with drainage, produce good crops of tobacco, cotton, corn and soybeans. They are good deep sandy soils and nearly level. Deer, quail and other game are plentiful in this section of the county.

Several of the largest industries in the county are located in this section. Some timberland improvement and development is being done in the midsection of this area.

Area 8 - Kingstree - Boggy Swamp

In this area, just south and east of Kingstree, Boggy Swamp runs from north to south and into Black River which crosses the southwest corner. These two main drainageways provide the outlets for the smaller tributaries of the area.

The western portion, in the vicinity of Black River, is covered by undeveloped swampland and swamptree growth. The low-lying parts are subject to overflow and flooding and provide hunting and fishing in the section. Drainage ditches therefore would benefit only a few higher land sites.

The eastern half of Area 8 is composed of farmland on either side of Boggy Swamp. The soils are nearly level and can be greatly benefitted by drainage ditches where outlets are improved or provided. Crops produced in this section are tobacco, corn, soybeans and some truck.

Area 9 - Salters - Lane - Gourdin

Area 9, located in the south central part of the county is bounded on the north by Laws Swamp and Black River and on the south by Santee River, the county line. The upper half of the area drains north into Black River and the lower end drains south into the Santee River. The middle quarter of the area, with the town of Lane in the center, is a nearly level section with few outlets.

Like Area 5, Area 9 has fewer improved drainageways than the areas north of Black River; a number of old plantations lease timberland hunting rights.

Most of the soils have relatively thin topsoil with clay subsoils. They can be described as nearly level and most are poorly drained. Some of the better farmland fields, on higher elevations, produce fair general crops and pasture. Some timber development is being done in the central section.

Area 10 - Hebron - Mouzon - Bennett Swamp

On the western side of the county, Area 10 is divided in the middle by Black River running west to east which provides the outlet for the upper two-thirds of the area. The lower third tributaries drain into Bennett Swamp which runs across the bottom end.

Most of the soils are nearly flat, improve with drainage and give good crop yields of tobacco, cotton, corn, soybeans and some truck. The river swamp area is subject to overflow, is undeveloped and provides hunting and fishing. Quail are abundant in the area.

Area 11 - Greeleyville - Heineman

Area 11 is a small block in the southwest corner of the county bordered by the Clarendon County line on the east, Santee River on the south and U. S. Highway No. 52 on the east. The town of Greeleyville is located in the center of the block with highways radiating in all directions from town.

Almost all of the drainage is toward and into tributaries of the Santee River on the south. Two bays, one southeast and one southwest of Greeleyville, occupy sizeable areas of undeveloped land as well as the Santee River Swamp which is subject to overflow.

The soils in the higher elevation areas respond to drainage ditches and yield fair gener-

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al crops.

A number of old plantations have leased hunting areas.

Factors Considered in Preparation of Plan

The Drainage Feasibility Study was prepared by engineers of the Soil Conservation Service with the assistance of the Williamsburg County Development Board and County Supervisor's office. On-site investigations were made of the outlets for each main canal, and the factors affecting drainage within the watershed, such as land use, river stages, flooding and the time of year in which flooding occurs, were studied.

Present land use and anticipated future land use was considered in preparing the design of needed drainage canals. Engineering information available through the Williamsburg County Work Unit office of the Soil Conservation Service was also used, particularly that pertaining to drainage investigations.

U. S. Geological Survey Topographic Maps were used to determine the general topography within each watershed and to assist in delineation of watersheds. A limited amount of instrument surveying was made to secure detailed information in some areas to determine direction of runoff and outlets.

Aerial photographs, scale 1" = 1320', flown in 1966, were used in recording field data and for the preparation of the drainage plan.

Agencies and commercial concerns, having knowledge of specific drainage problems, were consulted in making the final decisions in certain areas. Also, maps, surveys and plans available from these agencies were used.

In most instances, mains were located along natural drains with modifications in alignment to improve the flow and the collection of water. All needed laterals within the watersheds were not located since the purpose of the study is to locate and design only the main canals which will furnish the means of disposal of runoff from all parts of the watershed. All mains are terminated in rivers, creeks or natural outlets at a point where they have adequate capacity and depth.

No attempt was made to locate underground utilities such as telephone cables, gas pipelines, water mains and conduits as a part of this study. However, due consideration must be given to the location of these underground utilities during the preparation of the final plans.

In general, the drainage plan was limited to areas considered as "high lands", that is,five feet or more above mean low water.

Watersheds draining into the county from adjoining counties were determined for the purpose of designing main canals. The mains, however, are shown beginning at the county line. Due attention was given to possible land use changes in adjacent counties that would affect runoff coming into these watersheds.

Engineering Considerations

Engineering considerations for planning,design, construction, maintenance and other matters pertinent to the Main Drainage Canals Feasibility Study are listed below:

Design

The plan presented herewith is a Feasibility Study to estimate the cost and the extent of needed main drainage facilities and the physical practicability of drainage in the county. Detailed engineering surveys and designs will be required before any part of the proposed plan is constructed. All improvements should be made continuous. Layout and construction should begin at the outlet end and continue upstream.

Plans and designs contained in this report do not include a complete study of underground storm sewers near towns found in Areas 1,7,8, 9 and 11; there is a lack of information on original surveys and designs showing size, depth and location. Detailed studies will be needed to determine the present condition of these storm sewers and additional needs.

Culverts at railroad and road crossings were designed to satisfy the minimum requirements based on expected flow. Increases in size of these structures may be desirable to provide an added safety factor for passing runoff in excess of designed flow where future unforeseen improvements are to be made in the vicinity.

Organizations or agencies concerned with environmental protection should be consulted when the ecology of an area may be affected by the construction of main drainage canals.

Acquisition of Rights-of-way

The means for, and the acquisition of, adequate rights-of-way for the installation of main canals is absolutely essential. The right-of-way must be adequate to take care of width requirements for channel section, berm, spoil management and access. (See Figure No.2)

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Maintenance of Channels

A well organized and adequately financed maintenance program is essential to maintain design capacity in all canals.

Provision for annual maintenance or periodic reconstruction to maintain the effectiveness of the channel must be considered prior to construction. Many drainage enterprises fail to function as designed and this can be directly attributed to an inadequate maintenance program. Maintenance of designed depth of channels is one of the most important items in a maintenance program. The cost of maintenance may be reduced considerably if provision is made in channel designs for easy access and stabilization of silt-contributing areas, such as ditch side slopes, new road fills and road ditch intersections, immediately following construction.

Obstructions

Construction of fences, walks and other structures that may retard channel flow should not be permitted. Other structures such as culverts, bridge piers, trestles, etc. should be designed to result in minimum interference with the channel flow. Dumping trash, garbage and other debris in channels should be prohibited.

Definition of Terms

Brief descriptions of terms used in this report are listed below in alphabetical order.

c.f.s. - Abbreviation for cubic feet per second; a unit of water-flow sometimes called "second feet."

Infiltration - The entrance of water into surface horizons of soil.

Internal Drainage - The movement of water through the soil profile. The rate is affected by the texture of the surface soil and of the subsoil and by the height of the water table. A wet, deep sand may have slow internal drainage when the water table is high,and rapid internal drainage when the water table is low. A plastic, sandy clay soil may have slow internal drainage regardless of water table height.

Lateral Ditch - A major ditch in a drainage system which serves as a link between the main ditch and the collection system in a segment of the watershed.

Main Canal (Ditch or Channel) - The principal channel which conducts the drainage water from the watershed to the outlet.

Permeability Rate - The rate of movement of water through the soil.

Profile, Soil - A vertical section of the soil through all its horizons and extending into the parent material.

Reach - A length of channel selected for use in hydraulic computations.

Relief - The elevations or inequalities of a land surface, considered collectively.

Runoff, Surface - The total rainfall minus losses from interception, infiltration, evapotranspiration, and surface storage; that which moves across the ground to a stream or depression.

Runoff, Subsurface - Water that infiltrates the soil and reappears as seepage or spring flow.

Soil Drainage - (1) The rapidity and extent of the removal of water from the soil by runoff and flow through the soil to underground spaces. (2) As a condition of the soil, the frequency and duration of periods when the soil is free of saturation. For example, in well-drained soils, the water is removed readily, but not rapidly; in poorly drained soils, the root zone is waterlogged for long periods and the roots of ordinary crop plants cannot get enough oxygen; and in excessively drained soils, the water is removed so completely that most crop plants are damaged by lack of water.

Soil Structure - The arrangement of the individual grains and aggregates that make up the soil mass; may refer to the natural arrangements of the soil when in place and undisturbed or to the soil at any degree of disturbance.

Subsoil - In soils with weak profile development, the subsoil can be defined as the soil below the plowed soil (or its equivalent of surface soil) in which roots normally grow.

Surface Soil - The soil ordinarily moved in tillage or the equivalent in uncultivated soil about six to ten inches in thickness.

Terrace (Geological) - An old alluvial plain, ordinarily flat or undulating, bordering a river, lake or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, Soil - The relative proportions of sand, silt and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles are as follows: sand, loamy sand, sandy loam,

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loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine,"or "very fine." A coarse-textured soil is one high in sand content; a fine-textured soil is one high in clay content.

Water-holding Capacity - The ability of a soil to hold water. The capacity (or ability) of soil to hold water against gravity.

Watershed - An area of land from which all water that falls within the area converges toward and discharges past a designated point.

Potential Sites For Lake Dams

While field data was being collected for this report, several potential sites for lakes were observed across the county. These were noted and tabulated as possible sites for dams to provide the lakes. It should be understood that these sites were listed as observations only and no survey was made otherwise. It will be necessary to make a complete engineering investigation to determine their economic feasibility. The potential site locations are listed in table 4.

TABLE 4

POTENTIAL DAM SITE LOCATIONS

Planning Area	No. of Sites	Description
Area # 1	1	On Poplar Hill Branch just north of S. C. Hwy. 512.
2	1	On Indian Town Swamp just north of S. C. Hwy. 512.
3	1	On Headless Swamp east of S. C. Hwy. 121.
4	1	On Cedar Swamp between S. C. Hwy. 261 and S. C. Hwy. 24.
5	1	On Ox Swamp north of Highway 521 east of Burrows Crossroads.
7	1	On Kingstree Swamp, north of S. C. Hwy. 44 near Fennell Field.
8	1	On Boggy Swamp, north of S. C. Hwy. 147.
10	1	On Pudding Swamp, north of S. C. Hwy. 287 near McIntosh Farms.

Technical References

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U. S. Department of Commerce, Bureau of Public Roads - HYDRAULIC CHARTS FOR THE SELECTION OF HIGHWAY CULVERTS.

U. S. Department of Agriculture, Soil Conservation Service - NATIONAL ENGINEERING HANDBOOK - HYDROLOGY - Section 4.

FEASIBILITY STUDY FOR MAIN DRAINAGE CANALS in Colleton County.

FEASIBILITY STUDY FOR MAIN DRAINAGE CANALS in Beaufort County.

Authority and Acknowledgement

Authorization for preparation of the Feasibility Study of Requirements for Main Drainage Canals for Williamsburg County is the result of a cooperative agreement entered into on June 22, 1967 by:

Williamsburg County Legislative Delegation -

LaNue Floyd, State Senator
J. Henry Stuckey, Member of House of Representatives
Ernest Carter, Member of House of Representatives

Williamsburg County Board of Commissioners -

J. Hugh McCutchen, Supervisor
T. R. Grier
D. C. Haddock
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Williamsburg Soil and Water Conservation District

Soil Conservation Service -

A. T. Chalk, State Conservationist

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J. Victor Rowell, Member of House of Representatives
Frank H. McGill, Member of House of Representatives

Williamsburg County Board of Commissioners -

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Explanation of Engineering Data Tables

The following Engineering Data Tables contain information, by areas, for each main canal and lateral, by watersheds.

An explanation of each column in the Engineering Data sheets is as follows:

Column 1 CANAL NUMBER
Numbering of main canals begin with M-1 and laterals with L-1, in each area.

Column 2 LENGTH IN FEET
Stationing of all mains and laterals begins at the upper end (headwaters) and continues toward the outlet. Mains and laterals are shown in reaches or sections in the data tables for design purposes. Each reach or section reflects a change in water concentration resulting from entrance of lateral drainage.

Column 3 WATERSHED IN ACRES
See definition of terms.

Column 4 DISCHARGE-CUBIC FEET PER SECOND
From appropriate drainage coefficient curves dependent on land use. (See Fig. No. 1)

Column 5 TOP WIDTH IN FEET
Self explanatory.

Column 6 BOTTOM WIDTH IN FEET
Self explanatory.

Column 7 AVERAGE DEPTH IN FEET
Self explanatory.

Column 8 EXCAVATION IN CUBIC YARDS
Self explanatory.

Column 9 RIGHT-OF-WAY CLEARING IN ACRES
Self explanatory.

Column 10 REQUIRED RIGHT-OF-WAY WIDTH IN FEET
Minimum width requirements for channel cross section, spoil management, berm width and maintenance access road.

Column 11 CULVERTS, BRIDGES EXISTING - LENGTH & SIZE
Existing in-place culverts or bridge; re-used in Col. 12 or disposition is shown by the footnote.

Column 12 CULVERTS, LOWERING-LENGTH AND SIZE
Existing culverts shown in Col. 11 which are to be re-used by lowering to a new grade elevation.

Column 13 CULVERTS, BRIDGES AND TRESTLES NEW-LENGTH & SIZE
Refers to additional culverts, bridges and trestles required to handle design discharge. Design is based on round concrete pipe.

R. C. Br. - Reinforced concrete bridge
C. T. Br. - Creosoted timber bridge
U. T. Br. - Untreated timber bridge
C. T. Tres. - Creosoted timber trestle

Column 14 TOTAL ESTIMATED COST IN DOLLARS
Total costs shown include only the estimated construction costs and do not include engineering costs, or the cost of acquiring required right-of-way. When preparing the final cost estimates these engineering costs and right-of-way costs should be included in the total cost of the project. Total estimated costs, as shown, are based on the following unit prices prevailing in Williamsburg County, in 1970: (A summary of total costs by areas is shown in Table 5.)

EXCAVATION
General - $0.25 per cu. yd.

RIGHT-OF-WAY CLEARING
General - $200.00 per ac.

LOWERING EXISTING CULVERTS
Labor and equipment costs only.

NEW CULVERT AND CONDUIT COSTS
Based on present cost of circular concrete pipe.

BRIDGES
Precast reinforced concrete bridges were used under main highways and secondary roads.

Prevailing cost - $1000 per 15' span.

TABLE NO. 5

SUMMARY OF QUANTITIES AND COSTS BY AREAS

FROM ENGINEERING AND DESIGN DATA

Area Number	Length of Canals (feet)	Excavation (cubic yards)	Right-of-Way Clearing (acres)	Estimated Total Cost (dollars) 1/
1	284,800	534,452	247.4	211,777
2	321,000	600,955	278.7	238,798
3	195,800	374,377	172.5	150,761
4	416,100	856,906	386.5	329,423
5	281,900	555,519	253.4	208,659
6	387,200	889,809	389.9	351,580
7	308,200	148,543	69.9	57,276
8	214,800	371,628	176.1	144,446
9	324,600	631,869	289.8	239,769
10	260,500	431,391	203.5	169,305
11	251,300	469,653	215.9	183,271
Sub-Totals	3,246,200	5,865,102	2,683.6	2,285,065
Plus 15% added for contingencies -				342,760
County Totals	3,246,200	5,865,102	2,683.6	2,627,825

1/ Based on 1971 prices.

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ENGINEERING AND DESIGN DATA

Area 1 - Hemingway - Union Crossroads - Outland

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	800	58	6	13	3	5	1184	0.6	38	- - -	- - -	- - -	
M-1	9000	1302	81	27	7	5	20,000	8.9	49	- - -	- - -	- - -	
L-1	2500	172	15	13	3	5	3700	1.8	38	40' - 24"	- - -	40' - 30"	
L-1	3400	324	26	13	3	5	5032	2.5	38	40' - 30"1/	- - -	40' - 42"	
L-1	700	332	26	13	3	5	1036	0.5	38	- - -	- - -	- - -	
Total-1	16,400						30,952	14.3					12,037.00
M-2	7400	480	35	13	3	5	10,952	5.4	38	(2)20' - 24"1/	- - -	30' - 48"	
M-2	2900	804	54	15	5	5	5365	2.5	44	- - -	- - -	- - -	
M-2	4000	1540	94	16	6	5	8160	3.7	46	(2)30' - 24"1/ (3)30' - 18"1/	- - -	15'R.C.Br.	
M-2	2400	2072	120	17	7	5	5328	2.4	49	- - -	- - -	- - -	
M-2	3000	3012	165	22	12	5	9450	3.9	62	- - -	- - -	- - -	
L-1	2100	128	12	13	3	5	3108	1.5	38	40' - 18"1/	- - -	40' - 30"	
L-1	1000	152	14	13	3	5	1480	0.7	38	40' - 18"1/	- - -	40' - 30"	
L-1	2700	292	23	13	3	5	3996	2.0	38	- - -	- - -	- - -	
L-2	7700	688	47	13	3	5	11,396	5.7	38	(2)20' - 24"1/	- - -	15' R.C. Br.	
L-2	600	738	49	13	3	5	888	0.4	38	- - -	- - -	- - -	
Total-2	33,800						60,123	28.2					24,571.00
M-3	2700	132	12	13	3	5	3996	2.0	38	30' - 24"1/	- - -	30' - 30"	
M-3	2400	348	18	13	3	5	3552	1.8	38	- - -	- - -	- - -	
Total-3	5100						7548	3.8					3,067.00
M-4	1500	300	24	13	3	5	2220	1.1	38	30' - 18"1/	- - -	30' - 42"	
M-4	3100	556	40	13	3	5	4588	2.3	38	50' - 36"1/	- - -	15' R.C. Br.	
M-4	5100	968	63	16	6	5	10,404	4.7	46	- - -	- - -	- - -	
M-4	2400	1548	94	18	8	5	5784	2.5	52	45' R.C. Br.	- - -	- - -	
M-4	2000	3024	166	26	16	5	7780	3.1	73	75' Tres.	- - -	- - -	
L-1	2000	152	14	13	3	5	2960	1.5	38	6'x 6'	- - -	- - -	
L-1	3800	364	28	13	3	5	5624	2.8	38	- - -	- - -	- - -	
L-2	3600	200	17	13	3	5	5328	2.6	38	40' - 30"1/	- - -	40' - 36"	
L-2	2300	320	25	13	3	5	3404	1.7	38	40' - 36"1/	- - -	40' - 42"	
L-2	3300	456	34	13	3	5	4884	2.4	38	- - -	- - -	- - -	
Total-4	29,100						52,976	24.7					21,364.00
M-5	7600	600	42	13	3	5	11,248	5.6	38	40' - 48"	- - -	- - -	
Total-5	7600						11,248	5.6					3,932.00

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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 1 - Hemingway - Union Crossroads - Outland

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-6	3400	260	21	13	3	5	5032	2.5	38	50' - 36"	50' - 36"	- - -	
M-6	4300	488	36	13	3	5	6364	3.2	38	- - -	- - -	- - -	
Total-6	7700						11,396	5.7					4,589.00
M-7	2700	524	9 2/	13	3	5	3996	2.0	38	30' - 36"1/	- - -	30' - 48"	
M-7	8400	1604	22 2/	13	3	5	12,432	6.2	38	(2)40' - 30"1/	- - -	15' R.C. Br.	
M-7	5600	2092	58 3/	15	5	5	10,360	4.9	42	45' R.C. Br.	- - -	- - -	
Total-7	16,700						26,788	13.1					11,097.00
M-8	4000	432	32	13	3	5	5920	2.9	38	(2)40' - 36"1/	- - -	40' - 42"	
M-8	3200	788	54	13	3	5	4736	2.4	38	(2) 5' x 5'	- - -	- - -	
Total-8	7200						10,656	5.3					4,604.00
M-9	5200	400	31	13	3	5	7696	3.8	38	50' - 48"1/	- - -	15' R.C. Br.	
M-9	2500	568	41	13	3	5	3700	1.8	38	40' - 42"1/	- - -	15' R.C. Br.	
M-9	1100	592	42	13	3	5	1628	0.8	38	- - -	- - -	- - -	
Total-9	8800						13,024	6.4					6,536.00
M-10	3800	416	81 4/	17	7	5	8,436	3.8	49	50' - 30"1/	- - -	15' R.C. Br.	
M-10	2400	596	112 4/	20	10	5	6,672	2.8	57	- - -	- - -	- - -	
M-10	1100	680	125 4/	22	12	5	3,465	1.4	62	- - -	- - -	- - -	
M-10	1900	1084	184 4/	28	18	5	8,094	3.1	78	- - -	- - -	- - -	
M-10	400	1696	231 5/	28	18	5	1,704	0.7	78	45' R.C. Br.	- - -	- - -	
M-10	600	1756	239 5/	28	18	5	2,556	1.0	78	- - -	- - -	- - -	
M-10	2600	2816	323 5/	34	24	5	13,962	5.3	94	- - -	- - -	- - -	
L-1	8800	552	40	13	3	5	13,024	6.5	38	- - -	- - -	- - -	
L-2	6700	756	52	13	3	5	9,916	4.9	38	30' R.C. Br.	- - -	- - -	
L-2	3200	852	56	15	5	5	5,920	2.8	44	- - -	- - -	- - -	
Total-10	31,500						73,749	32.3					25,896.00
M-11	1800	196	45 4/	14	4	5	3006	1.4	41	(2) 5'x 5'	- - -	- - -	
M-11	900	260	57 4/	15	5	5	1665	0.8	44	30' - 24"1/	- - -	15' R.C. Br.	
M-11	2400	528	98 4/	19	9	5	6216	2.7	55	15' R.C. Br.	- - -	- - -	
M-11	1300	552	102 4/	19	9	5	3367	1.5	55	(2) 6' x 6'	- - -	- - -	
M-11	1500	620	113 4/	20	10	5	4170	1.8	57	34'C.T. Tres.	- - -	- - -	
M-11	900	1124	190 4/	24	14	5	3168	1.3	68	(2) 6'x 8'	- - -	- - -	
M-11	3800	1440	232 4/	28	18	5	16,188	6.3	78	20' - 30"1/ 20' - 24"1/	- - -	30' R.C. Br.	
M-11	2300	1512	238 4/	28	18	5	9798	3.8	78	- - -	- - -	- - -	

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ENGINEERING AND DESIGN DATA

Area 1 - Hemingway - Union Crossroads - Outland

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CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
L-1	2500	164	39 4/	13	3	5	3700	1.8	38	40' - 30" 1/	- - -	15' R.C. Br.	
L-1	1400	220	48 4/	14	4	5	2338	1.1	41	- - -	- - -	- - -	
L-1	1300	400	80 4/	17	7	5	2886	1.3	49	34' C.T. Tres.	- - -	- - -	
Total-11	20,100						56,502	23.8					22,883.00
M-12	1800	92	9	13	3	5	2664	1.3	38	20' - 18" 1/	- - -	30' - 24"	
M-12	2200	404	31	13	3	5	3256	1.6	38	40' - 30" 1/	- - -	40' - 42"	
M-12	2500	524	38	13	3	5	3700	1.8	38	(2) 6' x 8'	- - -	- - -	
M-12	2900	708	49	13	3	5	4292	2.1	38	- - -	- - -	- - -	
M-12	1600	996	110 5/	18	8	5	3856	1.7	52	15' R.C. Br.	- - -	- - -	
L-1	300	16	6 4/	13	3	5	444	0.2	38	(2) 8' x 8'	- - -	- - -	
L-1	3700	152	36 4/	13	3	5	5476	2.7	38	- - -	- - -	- - -	
Total-12	15,000						23,688	11.4					9,322.00
M-13	9100	750	51	14	4	5	15,197	7.3	41	- - -	- - -	- - -	
M-13	2500	1000	65	16	6	5	5100	2.3	46	- - -	- - -	- - -	
M-13	3000	1432	88	18	8	5	7230	3.2	52	(2) 8' x 8'	- - -	- - -	
M-13	2900	1564	95	18	8	5	6989	3.1	52	- - -	- - -	- - -	
M-13	500	2136	123	22	12	5	1575	0.6	62	(2)40' - 30" 1/	- - -	30' R.C. Br.	
L-1	2800	132	12	13	3	5	4144	2.1	38	40' - 18" 1/ 40' - 24" 1/	- - -	40' - 30"	
L-1	5000	536	39	13	3	5	7400	3.7	38	(2)20' - 30" 1/	- - -	30' - 48"	
L-1	1000	556	40	13	3	5	1480	0.7	38	- - -	- - -	- - -	
Total-13	26,800						49,115	23.0					20,218.00
M-14	2000	108	10	13	3	5	2960	1.5	38	50' - 36"	50' - 36"	- - -	
M-14	5900	596	42	13	3	5	8732	4.3	38	30' R.C. Br.	- - -	- - -	
M-14	2000	680	47	14	4	5	3340	1.6	41	(2) 5' x 5'	- - -	- - -	
Total-14	9900						15,032	7.4					5,838.00
M-15	6000	344	26 2/	13	3	5	8880	4.4	38	50' - 36" 1/	- - -	40' - 42"	
Total-15	6000						8880	4.4					3,980.00
M-16		1808	Georgetown County							(2)50' - 48"	- - -	- - -	
M-16	5000	2056	119	22	12	5	15,750	6.4	62	- - -	- - -	- - -	
M-16	2100	2992	163	26	16	5	8169	3.2	73	(3)10' x 10'	- - -	- - -	
L-1	1500	164	15	13	3	5	2220	1.1	38	50' - 30"	50' - 30"	- - -	
L-1	5500	772	52	14	4	5	9185	4.4	41	- - -	- - -	- - -	
Total-16	14,100						35,324	15.1					12,400.00

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 1 - Hemingway - Union Crossroads - Outland

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-17		40	Georgetown County							50' - 24"	- - -	- - -	
M-17	4400	160	12	13	3	5	6512	3.2	38	- - -	- - -	- - -	
Total-17	4400						6512	3.2					2,268.00
M-18	2600	776	53	13	3	5	3848	1.9	38	20' - 24"1/	- - -	15' R.C. Br.	
M-18	4000	1008	66	14	4	5	6680	3.2	41	(2)40' - 24"1/	- - -	15' R.C. Br.	
M-18	2400	1132	73	15	5	5	4440	2.1	44	- - -	- - -	- - -	
M-18	3100	2044	118	18	8	5	7471	3.3	52	- - -	- - -	- - -	
L-1	4000	656	46	13	3	5	5920	2.9	38	(3)20' - 24"1/ 20' - 18"1/	- - -	15' R.C. Br.	
L-1	400	688	48	13	3	5	592	0.3	38	- - -	- - -	- - -	
Total-18	16,500						28,951	13.7					12,978.00
M-19	2400	348	27	13	3	5	3552	1.8	38	30' R.C. Br.	- - -	- - -	
M-19	5700	780	52	13	3	5	8436	4.2	38	- - -	- - -	- - -	
Total-19	8100						11,988	6.0					4,197.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q = 10M^{5/6}$.

3/ Runoff curve used: $Q = 45M^{5/6}$ for accumulated area applicable + Q curve for segment (s) using other runoff coefficients.

4/ Runoff curve used: $Q = 118M^{5/6}$.

5/ Runoff curve used: $Q = 118M^{5/6}$ for accumulated area applicable + Q curve for segment (s) using other runoff coefficients.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 2 - Indiantown - Stuckey - New Morrisville

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	4300	824	55	13	3	5	6364	3.2	38	40' - 60" 1/	- - -	15' R.C. Br.	
M-1	3700	994	65	14	4	5	6179	3.0	41	- - -	- - -	- - -	
M-1	2500	3342	177	24	14	5	8800	3.6	68	40'C.T.Br.	- - -	- - -	
M-1	4000	3842	201	26	16	5	15,560	6.2	78	- - -	- - -	- - -	
L-1	2600	288	23	13	3	5	3848	1.9	38	40' - 24" 1/	- - -	40' - 36"	
L-1	5300	768	53	13	3	5	7844	3.9	38	40' - 42" 1/	- - -	15' R.C. Br.	
L-1	1100	804	54	13	3	5	1628	0.8	38	- - -	- - -	- - -	
L-1	2000	1304	82	17	7	5	4440	2.0	49	(3)20' - 24" 1/	- - -	15' R.C. Br.	
L-1	4000	1924	113	20	10	5	11,120	4.7	57	- - -	- - -	- - -	
L-2	2600	236	20	13	3	5	3848	1.9	38	None	- - -	40' - 36"	
L-2	5500	452	34	13	3	5	8140	4.0	38	- - -	- - -	- - -	
L-3	2100	136	12	13	3	5	3108	1.5	38	None	- - -	40' - 30"	
L-3	5900	372	28	13	3	5	8732	4.3	38	- - -	- - -	- - -	
Total-1	45,600						89,611	41.0					35,443.00
M-2	800	276	22	13	3	5	1184	0.6	38	40' - 36"	40' - 36"	- - -	
M-2	1200	312	25	13	3	5	1776	0.9	38	- - -	- - -	40' - 42"	
M-2	8400	1056	68	15	5	5	15,540	7.3	44	40' - 36" 1/	- - -	15' R.C. Br.	
M-2	600	1084	69	15	5	5	1110	0.5	44	- - -	- - -	- - -	
Total-2	11,000						19,610	9.3					9,122.00
M-3	1600	124	11	13	3	5	2368	1.2	38	20' - 18" 1/	- - -	30' - 30"	
M-3	3700	270	22	13	3	5	5476	2.7	38	(3)30' - 24" 1/	- - -	30' - 36"	
M-3	1500	318	25	13	3	5	2220	1.1	38	- - -	- - -	- - -	
M-3	2500	2006	116	22	12	5	7875	3.2	62	45' R.C. Br.	- - -	- - -	
L-1	2400	664	46	13	3	5	3552	1.8	38	(2)30' - 24" 1/	- - -	15' R.C. Br.	
L-1	4000	1488	91	16	6	5	8160	3.7	46	- - -	- - -	- - -	
Total-3	15,700						29,651	13.7					12,053.00
M-4	1600	268	22	13	3	5	2368	1.2	38	40' - 24" 1/	- - -	40' - 36"	
M-4	1700	322	25	13	3	5	2516	1.2	38	- - -	- - -	- - -	
M-4	4200	2384	133	22	12	5	13,230	5.4	62	- - -	- - -	- - -	
L-1	4900	1270	80	17	7	5	10,878	4.8	49	30'R.C. Br.	- - -	- - -	
L-1	5000	1806	106	17	7	5	11,100	4.9	49	- - -	- - -	- - -	
Total-4	17,400						40,092	17.5					14,163.00
M-5	5100	640	45	13	3	5	7548	3.7	38	(2)40' - 36" 1/	- - -	15' R.C. Br.	
M-5	4200	1076	69	15	5	5	7770	3.7	44	(3)40' - 48" 1/	- - -	15' R.C. Br.	
M-5	4000	1380	86	16	6	5	8160	3.7	46	30' R.C. Br.	- - -	- - -	

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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 2 - Indiantown-Stuckey- New Morrisville

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-5	1500	1568	96	19	9	5	3885	1.7	55	(2)30' - 30"1/	- - -	30'R.C. Br.	
										(2)30' - 24"1/			
M-5	3000	1884	112	20	10	5	8340	3.5	57	- - -	- - -	- - -	
Total-5	17,800						35,703	16.3					16,186.00
M-6	4000	1132	73	16	6	5	8160	3.7	46	- - -	- - -	- - -	
M-6	1600	1392	86	18	8	5	3856	1.7	52	- - -	- - -	- - -	
M-6	2700	3220	174	26	16	5	10,503	4.2	73	45' R.C. Br.	- - -	- - -	
L-1	3700	164	15	13	3	5	5476	2.7	38	20' - 24"1/	- - -	30' - 30"	
L-1	2000	228	19	13	3	5	2960	1.5	38	- - -	- - -	- - -	
L-2	3300	560	40	13	3	5	4884	2.4	38	- - -	- - -	- - -	
L-2	1000	1292	80	17	7	5	2220	1.0	49	- - -	- - -	- - -	
L-3	3000	704	48	14	4	5	5010	2.4	41	- - -	- - -	- - -	
Total-6	21,300						43,069	19.6					15,107.00
M-7	4800	292	23	13	3	5	7104	3.5	38	40' - 24"1/	- - -	40' - 36"	
M-7	7900	840	56	15	5	5	14,615	6.9	44	- - -	- - -	- - -	
M-7	300	940	62	16	6	5	612	0.3	46	- - -	- - -	- - -	
L-1	1800	84	8	13	3	5	2664	1.3	38	- - -	- - -	- - -	
Total-7	14,800						24,995	12.0					9,289.00
M-8	3800	236	20	13	3	5	5624	2.8	38	(2)20' - 24"1/	- - -	30' - 36"	
M-8	1300	296	23	13	3	5	1924	1.0	38	(2)30' - 30"1/	- - -	30' - 42"	
M-8	1900	412	31	13	3	5	2812	1.4	38	- - -	- - -	- - -	
Total-8	7000						10,360	5.2					4,770.00
M-9	3000	100	10	13	3	5	4440	2.2	38	30' - 24"	30' - 24"	- - -	
M-9	1900	128	12	13	3	5	2812	1.4	38	- - -	- - -	- - -	
Total-9	4900						7252	3.6					2,713.00
M-10	4100	280	23	13	3	5	6068	3.0	38	40' - 36"	40' - 36"	- - -	
										40' - 36"1/			
M-10	1000	532	38	13	3	5	1480	0.7	38	- - -	- - -	- - -	
L-1	3100	200	17	13	3	5	4588	2.3	38	- - -	- - -	- - -	
Total-10	8200						12,136	6.0					4,714.00
M-11	1600	268	22	13	3	5	2368	1.2	38	40' - 40"	40' - 42"	- - -	
M-11	3800	538	39	13	3	5	5624	2.8	38	- - -	- - -	- - -	
Total-11	5400						7992	4.0					3,478.00

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

ENGINEERING AND DESIGN DATA

Area 2 - Indiantown - Stuckey - New Morrisville

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-12	7300	324	25	13	3	5	10,804	5.4	38	- - -	- - -	- - -	
Total-12	7300						10,804	5.4					3,781.00
M-13	3500	366	28	13	3	5	5180	2.6	38	- - -	- - -	- - -	
M-13	3600	716	49	14	4	5	6012	2.9	41	40' - 36"1/	- - -	15' R.C. Br.	
M-13	2100	808	55	15	5	5	3885	1.8	44	- - -	- - -	- - -	
Total-13	9200						15,077	7.3					6,229.00
M-14	1000	36	4	13	3	5	1480	0.7	38	30' - 18"1/	- - -	30' - 24"	
M-14	4600	256	21	13	3	5	6808	3.4	38	40' - 36"	40' - 36"	- - -	
M-14	2000	372	28	13	3	5	2960	1.5	38	- - -	- - -	- - -	
Total-14	7600						11,248	5.6					4,652.00
M-15	3100	228	19	13	3	5	4588	2.3	38	40' - 30"1/	- - -	40' - 36"	
M-15	3000	404	31	13	3	5	4440	2.2	38	(3)20' - 18"1/	- - -	30' - 42"	
M-15	2700	588	42	13	3	5	3996	2.0	38	- - -	- - -	- - -	
Total-15	8800						13,024	6.5					5,856.00
M-16	5900	404	31	13	3	5	8732	4.3	38	6'x 6'	- - -	- - -	
Total-16	5900						8732	4.3					3,043.00
M-17	3600	128	12	13	3	5	5328	2.6	38	50' - 36"	50' - 36"	- - -	
M-17	2000	250	20	13	3	5	2960	1.5	38	- - -	- - -	- - -	
M-17	500	256	21	13	3	5	740	0.4	38	- - -	- - -	- - -	
Total-17	6100						9028	4.5					3,757.00
M-18	3000	400	29	13	3	5	4440	2.2	38	- - -	- - -	- - -	
M-18	4300	704	49	14	4	5	7181	3.5	41	40' - 30"1/	- - -	15' R.C. Br.	
M-18	1700	768	52	14	4	5	2839	1.4	41	- - -	- - -	- - -	
Total-18	9000						14,460	7.1					6,035.00
M-19	2000	440	33	13	3	5	2960	1.5	38	- - -	- - -	- - -	
M-19	2100	880	59	15	5	5	3885	1.8	44	- - -	- - -	- - -	
M-19	4300	1472	90	18	8	5	10,363	4.5	52	- - -	- - -	- - -	
M-19	800	2340	130	24	14	5	2816	1.1	68	30' R.C. Br.	- - -	- - -	
M-19	2200	2640	147	24	14	5	7744	3.1	68	- - -	- - -	- - -	
M-19	2000	4252	198 3/	30	20	5	9260	3.6	84	- - -	- - -	- - -	

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 2 - Indiantown-Stuckey- New Morrisville

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
L-1	4600	348	27	13	3	5	6808	3.4	38	- - -	- - -	- - -	
L-2	5300	724	11 2/	13	3	5	7844	3.9	38	None	- - -	15' R.C. Br.	
L-2	4000	1368	56 3/	15	5	5	7400	3.5	41	(2)40' - 30" 1/	- - -	15' R.C. Br.	
L-2	2400	1496	64 3/	16	6	5	4896	2.2	46	- - -	- - -	- - -	
Total-19	29,700						63,976	28.6					23,714.00
M-20		2358		Present canal as constructed is considered adequate.									
M-20		4888		Present canal as constructed is considered adequate.									
M-20		9308		Present canal as constructed is considered adequate.									
M-20	3200	10,128	101 2/	19	9	5	8288	3.6	55	(2)30' - 30" 1/ (2)30' - 24" 1/	- - -	30' R.C. Br.	
M-20	4900	11,004	108 2/	20	10	5	13,622	5.7	57	None	- - -	30' R.C. Br.	
M-20	1700	11,148	110 2/	20	10	5	4726	2.0	57	- - -	- - -	- - -	
M-20	3700	19,208	173 2/	26	16	5	14,393	5.7	73	- - -	- - -	- - -	
L-1	5300	412		13	3	5	7844	3.9	38	30' - 24" 1/	- - -	30' - 42"	
L-2	1500	196		13	3	5	2220	1.1	38	30' - 24" 1/	- - -	30' - 36"	
L-2	4800	536		13	3	5	7104	3.5	38	30' - 18" 1/	- - -	30' - 48"	
L-2	4800	736	11 2/	13	3	5	7104	3.5	38	- - -	- - -	- - -	
L-3	7500	864	13 2/	13	3	5	11,100	5.5	38	30' - 24" 1/	- - -	15' R.C. Br.	
L-3	7300	1748	23 2/	13	3	5	10,804	5.4	38	None	- - -	15' R.C. Br.	
L-3	4000	2272	29 2/	13	3	5	5920	2.9	38	- - -	- - -	- - -	
L-3		2436		Present canal as constructed is considered adequate.									
L-4	11,500	6248	67 2/	16	6	5	23,460	10.6	46	(2)20' - 18" 1/ (2)20' - 24" 1/	- - -	15' R.C. Br.	
L-4	2400	6336	68 2/	16	6	5	4896	2.2	46	45' C.T.Tres.	- - -	- - -	
L-4	5700	7556	79 2/	17	7	5	12,654	5.6	49	- - -	- - -	- - -	
Total-20	68,300						134,135	61.2					54,693.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q=10\,M^{5/6}$.

3/ Runoff curve used: $Q=45\,M^{5/6}$ for accumulated area applicable + Q for segment (s) using other runoff coefficients.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 3 - Nesmith - Rhems - Warsaw

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	2400	540	39	13	3	5	3552	1.8	38	30' - 30"1/ 30' - 24"1/	- - -	30' - 48"	
M-1	4700	912	60	14	4	5	7849	3.8	41	- - -	- - -	- - -	
Total-1	7100						11,401	5.6					4,750.00
M-2	3000	690	48	13	3	5	4440	2.2	38	- - -	- - -	- - -	
M-2	5500	1344	83	15	5	5	10,175	4.8	44	- - -	- - -	- - -	
M-2	2800	2600	144	19	9	5	7252	3.1	55	30' R.C. Br.	- - -	- - -	
Total-2	11,300						21,867	10.1					7,487.00
M-3	10,000	664	47	13	3	5	14,800	7.3	38	(2)50' - 30"	- - -	50' - 30"	
Total-3	10,000						14,800	7.3					5,860.00
M-4	6000	556	40	13	3	5	8880	4.4	38	15' U.T. Br.	- - -	- - -	
M-4	1200	820	55	15	5	5	2220	1.0	44	(2)30' - 36"1/	- - -	15' R.C. Br.	
M-4	6700	1772	105	17	7	5	14,874	6.6	49	45' R.C. Br.	- - -	- - -	
Total-4	13,900						25,974	12.0					9,893.00
M-5	5300	808	12 2/	13	3	5	7844	3.9	38	- - -	- - -	- - -	
M-5	3300	1208	42 3/	13	3	5	4884	2.4	38	- - -	- - -	- - -	
Total-5	8600						12,728	6.3					4,442
M-6	4200	472	35	13	3	5	6216	3.1	38	- - -	- - -	- - -	
M-6	7800	3000	164	26	16	5	30,342	12.0	73	12' C.T.Br.1/	- - -	30' R.C. Br.	
M-6	1800	3112	168	26	16	5	7002	2.8	73	- - -	- - -	- - -	
M-6	4900	7122	233 3/	32	22	5	24,500	9.3	90	- - -	- - -	- - -	
L-1	1000	1004	66	16	6	5	2040	0.9	46	(2)30' - 24"1/	- - -	15' R.C. Br.	
L-1	4600	1396	87	18	8	5	11,086	4.9	52	(2)30' - 24"1/	- - -	15' R.C. Br.	
L-2	6900	756	12 2/	13	3	5	10,212	5.1	38	(2)20' - 24"	(2)30' - 24"	- - -	
L-2	3900	1144	16 2/	13	3	5	5772	2.9	38	20' - 30"	30' - 30"	30' - 24"	
L-2	14,100	3058	37 2/	13	3	5	20,868	10.3	38	12' C.T. Br.	- - -	- - -	
L-2	3600	3522	42 2/	13	3	5	5328	2.6	38	- - -	- - -	- - -	
Total-6	52,800						123,366	53.9					46,551.00
M-7	2400	208	18	13	3	5	3552	1.8	38	30' - 18"1/	- - -	30' - 36"	
M-7	1200	300	25	13	3	5	1776	0.9	38	30' - 30"1/	- - -	30' - 42"	
M-7	2800	436	34	13	3	5	4144	2.1	38	30' - 24"	30' - 24"	30' - 36"	
M-7	2000	472	35	13	3	5	2960	1.5	38	- - -	- - -	- - -	
M-7	400	1703	101	19	9	5	1036	0.4	55	(2)30' - 24"1/	- - -	30' R.C. Br.	

4-31983 7-72

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH TEX. 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 3 - Nesmith-Rhems-Warsaw

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-7	1100	1737	103	19	9	5	2849	1.2	55	- - -	- - -	- - -	
M-7	2500	3319	176	24	14	5	8800	3.6	68	(3)20' - 30"1/	- - -	30' R.C. Br.	
M-7	3400	3507	186	24	14	5	11,968	4.8	68	- - -	- - -	- - -	
M-7	1800	4103	212	26	16	5	7002	2.8	73	30' - 30"1/	- - -	30' R.C. Br.	
										16'C.T. Br.1/	- - -		
L-1	6300	744	51	14	4	5	10,521	5.1	41	30' - 18"1/	- - -	15' R.C. Br.	
L-1	1400	786	54	15	5	5	2590	1.2	44	- - -	- - -	- - -	
L-2	4000	268	22	13	3	5	5920	2.9	38	20' - 30"1/	- - -	30' - 36"	
L-2	2900	776	53	13	3	5	4292	2.1	38	50' - 42"1/	- - -	15' R.C. Br.	
L-2	4800	1042	68	15	5	5	8880	4.2	44	30' - 30"1/	- - -	15' R.C. Br.	
L-2	900	1070	69	15	5	5	1665	0.8	44	- - -	- - -	- - -	
L-3	600	130	12	13	3	5	888	0.4	38	20' - 24"1/	- - -	30' - 30"	
L-3	4000	374	29	13	3	5	5920	2.9	38	20' - 30"1/	- - -	30' - 42"	
L-3	3800	506	37	13	3	5	5624	2.8	38	- - -	- - -	- - -	
Total-7	46,300						90,387	41.5					43,195.00
M-8	4500	308	24	13	3	5	6660	3.3	38	(2)50' - 30"1/	- - -	40' - 42"	
										(2)50' - 24"1/			
M-8	2000	356	28	13	3	5	2960	1.5	38	- - -	- - -	- - -	
M-8	700	792	32	13	3	5	1036	0.5	38	- - -	- - -	- - -	
M-8	2600	1196	76	16	6	5	5304	2.4	46	- - -	- - -	- - -	
M-8	2000	1628	97	17	7	5	4440	2.0	49	- - -	- - -	- - -	
L-1	5300	416	32	13	3	5	7844	3.9	38	- - -	- - -	- - -	
L-2	2000	188	16	13	3	5	2960	1.5	38	30' - 24"1/	- - -	30' - 30"	
L-2	1500	276	22	13	3	5	2220	1.1	38	30' - 18"1/	- - -	30' - 42"	
L-2	1200	304	24	13	3	5	1776	0.9	38	- - -	- - -	- - -	
L-3	5300	212	18	13	3	5	7844	3.9	38	- - -	- - -	- - -	
Total-8	27,100						43,044	21.0					16,921.00
M-9	6100	652	46	13	3	5	9028	4.5	38	(2)30' -24"1/	- - -	15' R.C. Br.	
										30' -30"1/			
M-9	3200	860	58	14	4	5	5344	2.6	41	18' C.T. Br.	- - -	- - -	
Total-9	9300						14,372	7.1					6,013.00
M-10	7400	972	64	14	4	5	12,358	5.9	41	15' U.T. Br.	- - -	- - -	
M-10	2000	1220	77	16	6	5	4080	1.8	46	8'x 8'	- - -	- - -	
Total-10	9400						16,438	7.7					5,649.00

1/ Remove or abandon (Not included in designed capacity.)
2/ Runoff curve used: $Q = 10 M^{5/6}$.
3/ Runoff curve used: $Q = 45 M^{5/6}$ for accumulated area applicable + Q curve for segment(s) using other runoff coefficients.
4/ Runoff curve used: $Q = 118 M^{5/6}$.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

ENGINEERING AND DESIGN DATA

Area 4 - Cades - Roper Crossroads - Cedar Swamp

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	3800	292	23	13	3	5	5624	2.8	38	10' x 10'	- - -	- - -	
M-1	1200	396	30	13	3	5	1776	0.9	38	(3)75' - 48"	- - -	- - -	
M-1	8000	1000	66	16	6	5	16,320	7.3	46	- - -	- - -	- - -	
M-1	1300	2112	122	22	12	5	4095	1.7	62	60' R.C. Br.	- - -	- - -	
M-1	4000	2516	141	24	14	5	14,080	5.7	68	(4)30' - 24"1/ 30' - 18"1/ 30' - 30"1/	- - -	30' R.C. Br.	
L-1	7300	324	25	13	3	5	10,804	5.4	38	- - -	- - -	- - -	
Total-1	25,600						52,699	23.8					19,934.00
M-2	4500	352	27	13	3	5	6660	3.3	38	(3)20' - 18"1/	- - -	40' - 42"	
M-2	3300	584	42	13	3	5	4884	2.4	38	(2)30' - 18"1/	- - -	15' R.C. Br.	
M-2	400	594	43	13	3	5	592	0.3	38	- - -	- - -	- - -	
Total-2	8200						12,136	6.0					6,114.00
M-3	12,400	1752	23 2/	13	3	5	18,352	9.1	38	45' R.C. Br.	- - -	- - -	
M-3	6300	2860	94 3/	18	8	5	15,183	6.7	52	- - -	- - -	- - -	
M-3	600	3436	123 3/	22	12	5	1890	0.8	62	- - -	- - -	- - -	
L-1	6100	540	39	13	3	5	9028	4.5	38	- - -	- - -	- - -	
Total-3	25,400						44,453	21.1					15,333.00
M-4	6200	688	49	13	3	5	9176	4.6	38	30' - 30"1/	- - -	15' R.C. Br.	
M-4	4000	1292	81	16	6	5	8160	3.7	46	(2)40' - 24"1/	- - -	15' R.C. Br.	
M-4	4100	1448	88	16	6	5	8364	3.8	46	- - -	- - -	- - -	
Total-4	14,300						25,700	12.1					10,845.00
M-5	4500	312	24	13	3	5	6660	3.3	38	40' - 24"1/ 40' - 18"1/	- - -	40' - 42"	
M-5	3000	372	28	13	3	5	4440	2.2	38	- - -	- - -	- - -	
Total-5	7500						11,100	5.5					4,775.00
M-6	3800	328	25	13	3	5	5624	2.8	38	30' - 24"1/	- - -	40' - 42"	
M-6	3800	588	42	13	3	5	5624	2.8	38	40' - 36"1/ 40' - 30"1/	- - -	15' R.C. Br.	
M-6	1300	624	44	13	3	5	1924	1.0	38	- - -	- - -	- - -	
Total-6	8900						13,172	6.6					6,493.00
M-7	9200	920	60	14	4	5	15,364	7.4	41	(2)40' - 36"1/	- - -	15' R.C. Br.	
M-7	7900	1412	87	16	6	5	16,116	7.3	46	- - -	- - -	- - -	
Total-7	17,100						31,480	14.7					11,810.00

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 4 - Cades - Roper Crossroads - Cedar Swamp

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-8	7900	452	33	13	3	5	11,692	5.8	38	40' - 30"1/	- - -	40' - 42"	
M-8	3300	536	39	13	3	5	4884	2.4	38	- - -	- - -	- - -	
Total-8	11,200						16,576	8.2					6,664.00
M-9	3300	480	35	13	3	5	4884	2.4	38	40' - 24"	40' - 24"	40' - 36"	
M-9	4500	1160	73	16	6	5	9180	4.1	46	- - -	- - -	- - -	
M-9	6900	1760	104	19	9	5	17,871	7.8	55	- - -	- - -	- - -	
M-9	2500	3292	175	28	18	5	10,650	4.1	78	40' C.T. Br.	- - -	- - -	
M-9	800	3320	176	28	18	5	3408	1.3	78	- - -	- - -	- - -	
M-9	4200	4052	209	30	20	5	19,446	7.5	84	- - -	- - -	- - -	
L-1	2800	432	33	13	3	5	4144	2.1	38	(2)30' - 24"1/	- - -	30' - 42"	
L-1	3200	868	58	15	5	5	5920	2.8	44	(2)30' - 30"1/	- - -	15' R.C. Br.	
L-1	4500	1220	77	17	7	5	9990	4.4	49	(2)30' - 30"1/	- - -	15' R.C. Br.	
L-1	800	1232	78	17	7	5	1776	0.8	49	- - -	- - -	- - -	
L-2	4000	280	23	13	3	5	5920	2.9	38	40' - 24"1/	- - -	40' - 36"	
L-2	3500	416	31	13	3	5	5180	2.6	38	20' - 24"1/	- - -	30' - 42"	
L-2	2500	468	34	13	3	5	3700	1.8	38	- - -	- - -	- - -	
Total-9	43,500						102,069	44.6					39,277.00
M-10	2600	320	25	13	3	5	3848	1.9	38	30' - 24" 30' - 18"1/	30' - 24"	30' - 30"	
M-10	4800	692	48	14	4	5	8016	3.9	41	30' - 24"1/ 30' - 18"1/	- - -	15' R.C. Br.	
M-10	5800	1728	103	19	9	5	15,022	6.5	55	- - -	- - -	- - -	
M-10	4100	2896	159	26	16	5	15,949	6.3	73	30' U.T.Br.	- - -	- - -	
L-1	5300	604	43	13	3	5	7844	3.9	38	- - -	- - -	- - -	
Total-10	22,600						50,679	22.5					18,769.00
M-11	6600	568	41	13	3	5	9768	4.8	38	(2)20' - 24"1/	- - -	30' - 48"	
M-11	3000	1600	97	19	9	5	7770	3.4	55	30' R.C. Br.	- - -	- - -	
M-11	8500	3284	177	28	18	5	36,210	14.0	78	(3)30' - 18"1/ 30' - 24"1/	- - -	30' R.C. Br.	
M-11	3300	3696	196	30	20	5	15,279	5.9	84	- - -	- - -	- - -	
M-11	7700	5468	269	36	26	5	44,198	16.4	105	35' U.T. Br.	- - -	- - -	
L-1	4500	476	35	13	3	5	6660	3.3	38	30' - 30"1/	- - -	30' - 48"	
L-1	3800	848	57	15	5	5	7030	3.3	44	- - -	- - -	- - -	
Total-11	37,400						126,915	51.1					45,508.00
M-12	2100	168	15	13	3	5	3108	1.5	38	(2)30' - 18"1/	- - -	30' - 30"	
M-12	1500	288	23	13	3	5	2220	1.1	38	30' - 30"1/	- - -	30' - 36"	
M-12	4000	536	39	13	3	5	5920	2.9	38	- - -	- - -	- - -	
Total-12	7600						11,248	5.5					4,812.00

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

Work Sheet 3-70 4-R-29076-A

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ENGINEERING AND DESIGN DATA

Area 4 - Cades - Roper Crossroads - Cedar Swamp

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-13	3200	144	13	13	3	5	4736	2.4	38	40' - 30"	40' - 30"	- - -	
M-13	1700	184	16	13	3	5	2516	1.2	38	- - -	- - -	- - -	
Total-13	4900						7252	3.6					2,973.00
M-14	5300	308	24	13	3	5	7844	3.9	38	- - -	- - -	- - -	
Total-14	5300						7844	3.9					2,741.00
M-15	3400	256	21	13	3	5	5032	2.5	38	40' - 36"	40' - 36"	- - -	
M-15	4100	556	40	13	3	5	6068	3.0	38	40' - 30"1/	- - -	15' R. C. Br.	
M-15	2400	632	45	13	3	5	3552	1.8	38	- - -	- - -	- - -	
Total-15	9900						14,652	7.3					6,603.00
M-16	1400	256	21	13	3	5	2072	1.0	38	30' - 30"1/	- - -	30' - 36"	
M-16	4500	392	30	13	3	5	6660	3.3	38	- - -	- - -	- - -	
Total-16	5900						8732	4.3					3,523.00
M-17	2400	756	52	14	4	5	4008	1.9	41	- - -	- - -	- - -	
M-17	4000	1260	79	17	7	5	8880	3.9	49	- - -	- - -	- - -	
M-17	3000	1464	89	18	8	5	7230	3.2	52	30' - 30"1/	- - -	15' R.C. Br.	
M-17	1200	1504	92	18	8	5	2892	1.3	52	- - -	- - -	- - -	
M-17	2800	1936	112	18	8	5	6748	3.0	52	- - -	- - -	- - -	
L-1	5400	276	22	13	3	5	7992	4.0	38	30' - 30"1/	- - -	30' - 36"	
L-1	1200	292	24	13	3	5	1776	0.9	38	- - -	- - -	- - -	
Total-17	20,000						39,526	18.2					15,001.00
M-18	4000	328	25	13	3	5	5920	2.9	38	(2)30' - 18"1/	- - -	30' - 42"	
Total-18	4000						5920	2.9					2,720.00
M-19	8700	376	29	13	3	5	12,876	6.4	38	30' - 24"1/	- - -	30' - 42"	
M-19	1200	444	33	13	3	5	1776	0.9	38	40' - 30"1/	- - -	40' - 42"	
M-19	4600	672	47	14	4	5	7682	3.7	41	- - -	- - -	- - -	
Total-19	14,500						22,334	11.0					9,323.00
M-20	2900	708	49	14	4	5	4843	2.3	41	30' - 24"1/	- - -	15' R.C. Br.	
M-20	5800	1068	68	16	6	5	11,832	5.3	46	- - -	- - -	- - -	
Total-20	8700						16,675	7.6					6,689.00

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U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

ENGINEERING AND DESIGN DATA

Area 4 - Cades - Roper Crossroads - Cedar Swamp

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-21	3600	416	31	13	3	5	5328	2.6	38	(2)30' - 24"1/	- - -	30' - 42"	
M-21	1600	462	34	13	3	5	2368	1.2	38	20' - 30"1/	- - -	30' - 48"	
M-21	1600	508	37	13	3	5	2368	1.2	38	- - -	- - -	- - -	
Total-21	6800						10,064	5.0					4,956.00
M-22	4200	500	37	13	3	5	6216	3.1	38	40' - 24"1/	- - -	15' R.C. Br.	
M-22	10,200	1544	94	16	6	5	20,808	9.4	46	30' C.T. Br.	- - -	- - -	
M-22	7100	2612	147	22	12	5	22,365	9.1	62	- - -	- - -	- - -	
M-22	7000	4620	235	28	18	5	29,820	11.6	78	45' R.C. Br.	- - -	- - -	
Total-22	28,500						79,209	33.2					27,442.00
M-23	5800	404	31	13	3	5	8584	4.3	38	40' - 36"1/	- - -	40' - 42"	
M-23	4900	716	49	13	3	5	7252	3.6	38	- - -	- - -	- - -	
Total-23	10,700						15,836	7.9					6,419.00
M-24	2900	550	40	13	3	5	4292	2.1	38	- - -	- - -	- - -	
M-24	4400	1080	69	16	6	5	8976	4.0	46	45' R.C. Br.	- - -	- - -	
M-24	2800	1256	78	17	7	5	6216	2.8	49	- - -	- - -	- - -	
Total-24	10,100						19,484	8.9					6,651.00
M-25	4000	348	27	13	3	5	5920	2.9	38	30' - 24"1/	- - -	30' - 42"	
M-25	300	600	42	13	3	5	444	0.2	38	30' - 30"1/	- - -	15' R.C. Br.	
M-25	2100	752	51	13	3	5	3108	1.5	38	40' - 48"1/	- - -	15' R.C. Br.	
M-25	1300	780	52	13	3	5	1924	1.0	38	- - -	- - -	- - -	
Total-25	7700						11,396	5.6					6,629.00
M-26	3600	272	22	13	3	5	5328	2.6	38	(2)30' - 18"1/	- - -	30' - 36"	
M-26	2900	480	35	13	3	5	4292	2.1	38	None	- - -	30' - 48"	
M-26	7300	1160	74	16	6	5	14,892	6.7	46	- - -	- - -	- - -	
M-26	5100	1488	90	18	8	5	12,291	5.4	52	40' - 30"1/	- - -	15' R.C. Br.	
M-26	2800	2064	119	22	12	5	8820	3.6	62	- - -	- - -	- - -	
L-1	2900	228	19	13	3	5	4292	2.1	38	30' - 15"1/	- - -	30' - 36"	
L-1	6500	464	34	13	3	5	9620	4.8	38	30' - 30"1/	- - -	30' - 36"	
										30' - 24"	30' - 24"		
Total-26	31,100						59,536	27.3					23,744.00

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 4 - Cades - Roper Crossroads - Cedar Swamp

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-27	5300	576	41	13	3	5	7844	3.9	38	- - -	- - -	- - -	
M-27	6300	1288	80	17	7	5	13,986	6.2	49	(2) 5'x 5'	- - -	- - -	
M-27	7100	1584	96	19	9	5	18,389	8.0	55	- - -	- - -	- - -	
Total-27	18,700						40,219	18.1					13,675.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q = 10 M^{5/6}$.

3/ Runoff curve used: $Q = 45 M^{5/6}$ for accumulated area applicable + Q curve for segment (s) using other runoff coefficients.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 5 - Millwood - Trio - Sutton's

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CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	6600	660	46	13	3	5	9768	4.8	38	40' - 60"	- - -	- - -	
Total-1	6600						9768	4.8					3,402.00
M-2	6400	440	33	13	3	5	9472	4.7	38	- - -	- - -	- - -	
Total-2	6400						9472	4.7					2,368.00
M-3	5000	660	43	13	3	5	7400	3.7	38	- - -	- - -	- - -	
M-3	1000	1168	75	15	5	5	1850	0.9	44	(2) 6'x 6'	- - -	- - -	
M-3	2300	1252	78	17	7	5	5106	2.3	49	- - -	- - -	- - -	
Total-3	8300						14,356	6.9					4,969.00
M-4	4400	480	35	13	3	5	6512	3.2	38	(2)40' - 30"1/	- - -	15' R. C. Br.	
M-4	400	492	36	13	3	5	592	0.3	38	- - -	- - -	- - -	
Total-4	4800						7104	3.5					3,476.00
M-5	5500	272	22	13	3	5	8140	4.0	38	40' - 30"1/	- - -	40' - 36"	
M-5	1300	328	26	13	3	5	1924	1.0	38	- - -	- - -	- - -	
Total-5	6800						10,064	5.0					4,156.00
M-6	3400	184	16	13	3	5	5032	2.5	38	40' - 24"1/	- - -	40' - 30"	
M-6	1700	220	19	13	3	5	2516	1.2	38	- - -	- - -	- - -	
M-6	1500	260	21	13	3	5	2220	1.1	38	- - -	- - -	- - -	
Total-6	6600						9768	4.8					3,962.00
M-7	3800	800	54	13	3	5	5624	2.8	38	30' - 30"1/ 30' - 18"1/	- - -	15' R.C. Br.	
M-7	1500	864	58	15	5	5	2775	1.3	44	30' - 30"1/ 30' - 18"1/	- - -	15' R.C. Br.	
M-7	3400	1024	67	16	6	5	6936	3.1	46	- - -	- - -	- - -	
M-7	2900	1468	90	18	8	5	6989	3.1	52	- - -	- - -	- - -	
M-7	600	1840	109	20	10	5	1668	0.7	57	(2)30' - 36" 30' - 24"	- - -	30' R.C. Br.	
M-7	1800	1912	112	20	10	5	5004	2.1	57	- - -	- - -	- - -	
L-1	6600	320	25	13	3	5	9768	4.8	38	- - -	- - -	- - -	
L-2	4000	356	28	13	3	5	5920	2.9	38	- - -	- - -	- - -	
Total-7	24,600						44,684	20.8					19,331.00

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 5 - Millwood - Trio - Sutton's

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-8	2800	400	30	13	3	5	4144	2.1	38	40' - 48"	- - -	- - -	
M-8	2300	464	34	13	3	5	3404	1.7	38	- - -	- - -	- - -	
M-8	4700	1344	84	16	6	5	9588	4.3	46	(2) 6' x 6'	- - -	- - -	
M-8	3500	1508	92	16	6	5	7140	3.2	46	- - -	- - -	- - -	
M-8	4200	3330	177	24	14	5	15,840	6.0	68	- - -	- - -	- - -	
M-8	3200	4112	212	30	20	5	14,816	5.7	84	- - -	- - -	- - -	
L-1	4500	440	33	13	3	5	6660	3.3	38	- - -	- - -	- - -	
L-2	1200	168	15	13	3	5	1776	0.9	38	None	- - -	30' - 30"	
L-2	5500	816	55	13	3	5	8140	4.0	38	- - -	- - -	- - -	
L-2		1152		Present canal as constructed is considered adequate.									
L-2		1432		Present canal as constructed is considered adequate.									
Total-8	31,900						71,508	31.2					24,537.00
M-9	3600	176	15	13	3	5	5328	2.6	38	30' - 24" 1/	- - -	30' - 30"	
M-9	2400	352	27	13	3	5	3552	1.8	38	30' - 24" 1/	- - -	30' - 42"	
										(2)30' - 18" 1/			
M-9	2800	500	37	13	3	5	4144	2.1	38	- - -	- - -	- - -	
Total-9	8800						13,024	6.5					5,636.00
M-10	7500	672	46	13	3	5	11,100	5.5	38	- - -	- - -	- - -	
M-10	3800	1008	64	14	4	5	6346	3.1	41	(2) 4' x 8'	- - -	- - -	
M-10	2000	1128	72	16	6	5	4080	1.8	46	15' U.T.Br. 1/	- - -	15' R.C. Br.	
M-10	3000	1272	79	17	7	5	6660	3.0	49	- - -	- - -	- - -	
Total-10	16,300						28,186	13.4					10,726.00
M-11	5800	640	45	13	3	5	8584	4.3	38	- - -	- - -	- - -	
M-11	2800	968	63	14	4	5	4676	2.2	41	(2) 7' x 7'	- - -	- - -	
M-11	1500	1028	67	15	5	5	2775	1.3	44	- - -	- - -	- - -	
Total-11	10,100						16,035	7.8					5,569.00
M-12	3000	148	13	13	3	5	4440	2.2	38	30' - 18" 1/	- - -	30' - 30"	
M-12	1300	208	17	13	3	5	1924	1.0	38	(2)40' - 24"	(2)40' - 24"	- - -	
M-12	1500	328	25	13	3	5	2220	1.1	38	- - -	- - -	- - -	
Total-12	5800						8584	4.3					3,906.00
M-13	8100	736	51	13	3	5	11,988	6.0	38	30' R.C. Br.	- - -	- - -	
M-13	3300	1000	66	14	4	5	5511	2.7	41	- - -	- - -	- - -	
M-13	4000	1904	111	18	8	5	9640	4.2	52	(2)40' - 36" 1/	- - -	30' R.C. Br.	
M-13	2000	1980	114	20	10	5	5560	2.3	57	- - -	- - -	- - -	
Total-13	17,400						32,699	15.2					13,215.00

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U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 5 - Millwood - Trio - Sutton's

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-14	4200	688	47	13	3	5	6216	3.1	38	- - -	- - -	- - -	
M-14	7300	1220	77	16	6	5	14,892	6.7	46	(2) 4' x 4'	- - -	- - -	
M-14	4400	1372	85	17	7	5	9768	4.3	49	- - -	- - -	- - -	
Total-14	15,900						30,876	14.1					10,539.00
M-15	3200	296	23	13	3	5	4736	2.4	38	40' - 18" 1/	- - -	40' - 42"	
M-15	1700	360	28	13	3	5	2516	1.2	38	- - -	- - -	- - -	
Total-15	4900						7252	3.6					3,413.00
M-16	5300	572	40	13	3	5	7844	3.9	38	- - -	- - -	- - -	
M-16	1400	876	58	14	3	5	2338	1.1	41	- - -	- - -	- - -	
Total-16	6700						10,182	5.0					3,545.00
M-17	1300	800	54	15	5	5	2405	1.1	44	(3)40' - 48" 1/	- - -	15' R.C. Br.	
M-17	500	940	62	16	6	5	1020	0.5	46	(2)40' - 36" 1/	- - -	15' R.C. Br.	
M-17	3000	1390	86	16	6	5	6120	2.8	46	- - -	- - -	- - -	
M-17	3000	1840	109	18	8	5	7230	3.2	52	- - -	- - -	- - -	
Total-17	7800						16,775	7.6					7,714.00
M-18	1100	1768	23 2/	13	3	5	16,280	8.0	38	(2) 40' - 24" 1/	- - -	15' R.C. Br.	
M-18	3900	2328	30 2/	13	3	5	5772	2.9	38	- - -	- - -	- - -	
M-18	8000	3252	90 3/	18	8	5	19,280	8.4	52	15' R.C. Br.	- - -	15' R.C. Br.	
M-18	1200	3456	102 3/	19	9	5	3108	1.3	55	(3)40' - 36" 1/	- - -	15' R.C. Br.	
M-18	2000	3812	120 3/	22	12	5	6300	2.6	62	- - -	- - -	- - -	
M-18	7500	5344	195 3/	24	14	5	26,400	10.7	68	- - -	- - -	- - -	
M-18	4700	5984	223 3/	28	18	5	20,022	7.8	78	- - -	- - -	- - -	
M-18	3400	6956	265 3/	30	20	5	15,742	6.1	84	- - -	- - -	- - -	
L-1	6100	564	40	13	3	5	9028	4.5	38	(2)30' - 18" 1/	- - -	30' - 48"	
L-1	600	580	41	13	3	5	888	0.4	38	- - -	- - -	- - -	
L-2	4200	468	34	13	3	5	6216	3.1	38	30' - 30" 1/	- - -	30' - 48"	
L-2	2200	556	40	13	3	5	3256	1.6	38	- - -	- - -	- - -	
L-2		660		Present branch run is considered adequate.									
Total-18	54,800						132,292	57.4					47,113.00
M-19	5500	502	36	13	3	5	8140	4.0	38	- - -	- - -	- - -	
M-19	5500	1004	66	14	4	5	9185	4.4	41	- - -	- - -	- - -	
M-19	2000	1108	71	15	5	5	3700	1.7	44	- - -	- - -	- - -	
Total-19	13,000						21,025	10.1					7,276.00

4-31983 7-72

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 5 - Millwood - Trio - Sutton's

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-20	4000	600	42	13	3	5	5920	2.9	38	- - -	- - -	- - -	
M-20	2300	980	64	14	4	5	3841	1.9	41	- - -	- - -	- - -	
M-20	2300	1364	85	16	6	5	4692	2.1	46	30' - 30" 1/ 30' - 24" 1/	- - -	15' R.C. Br.	
M-20	3400	1532	93	18	8	5	8194	3.6	52	- - -	- - -	- - -	
M-20	7000	4304	221	26	16	5	27,230	10.8	73	45' R.C. Br.	- - -	- - -	
L-1	3200	1600	97	17	7	5	7104	3.2	49	(2)30' - 24" 1/	- - -	30' R.C. Br.	
L-1	2200	1664	100	17	7	5	4884	2.2	49	- - -	- - -	- - -	
Total-20	24,400						61,865	26.7					23,806.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q = 10 M^{5/6}$.

3/ Runoff curve used: $Q = 45 M^{5/6}$ for accumulated area applicable + Q curve for segment(s) using other runoff coefficients.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 6 - Bloomingvale - Earle - Wee Tee

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	4600	528	39	13	3	5	6808	3.4	38	40' - 24"1/	- - -	15' R.C. Br.	
M-1	3800	900	60	14	4	5	6346	3.1	41	(2)30' - 24"1/	- - -	15' R.C. Br.	
M-1	2600	1244	78	16	6	5	5304	2.4	46	(2)30' - 24"1/	- - -	15' R.C. Br.	
										(2)30' - 18"1/	- - -	- - -	
M-1	3200	1424	88	16	6	5	6528	2.9	46	7' x 7'	- - -	- - -	
M-1	2200	1692	100	17	7	5	4884	2.2	49	- - -	- - -	- - -	
Total-1	16,400						29,870	14.0					13,267.00
M-2	4600	592	42	13	3	5	6808	3.4	38	50' - 24"1/	- - -	15' R.C. Br.	
Total-2	4600						6808	3.4					3,382.00
M-3	3400	532	39	13	3	5	5032	2.5	38	40' - 36"1/	- - -	15' R.C. Br.	
M-3	4000	676	47	14	4	5	6680	3.2	41	- - -	- - -	- - -	
M-3	7100	1780	106	17	7	5	15,762	7.0	49	- - -	- - -	- - -	
M-3	600	2496	140	20	10	5	1668	0.7	57	- - -	- - -	- - -	
L-1	2600	744	51	13	3	5	3848	1.9	38	- - -	- - -	- - -	
L-2	2100	412	31	13	3	5	3108	1.5	38	(2)20' - 24"1/	- - -	30' - 48"	
L-2	4100	644	45	13	3	5	6068	3.0	38	- - -	- - -	- - -	
Total-3	23,900						42,166	19.8					19,501.00
M-4	1700	164	15	13	3	5	2516	1.2	38	- - -	- - -	- - -	
M-4	3200	960	63	16	6	5	6528	2.9	46	(3) 6' x 6'	- - -	- - -	
L-1	5900	603	42	13	3	5	8732	4.3	38	30' - 18"1/	- - -	30' - 48"	
L-1	900	612	43	13	3	5	1332	0.7	38	- - -	- - -	- - -	
Total-4	11,700						19,108	9.1					7,377.00
M-5	900	240	19	13	3	5	1332	0.7	38	20' - 18"1/	- - -	30' - 36"	
M-5	4000	384	29	13	3	5	5920	2.9	38	(2) 5' x 5'	- - -	- - -	
Total-5	4900						7252	3.6					3,013.00
M-6	2100	92	9	13	3	5	3108	1.5	38	40' - 24"	40' - 24"	- - -	
M-6	4500	388	30	13	3	5	6660	3.3	38	- - -	- - -	- - -	
Total-6	6600						9768	4.8					3,642.00
M-7	6100	1260	17 2/	13	3	5	9028	4.5	38	- - -	- - -	15' R.C. Br.	
M-7	4800	2140	76 3/	16	6	5	9792	4.4	46	(2)30' - 30"1/	- - -	15' R.C. Br.	
M-7	4000	2932	117 3/	22	12	5	12,600	5.1	62	30'R.C. Br.	- - -	- - -	
M-7	4000	3732	156	26	16	5	15,560	6.2	73	60'R.C. Br.	- - -	- - -	
Total-7	18,900						46,980	20.2					17,785.00

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 6 - Bloomingvale - Earle - Wee Tee

4-31963 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-8	4500	404	31	13	3	5	6660	3.3	38	- - -	- - -	- - -	
M-8	1300	1504	92	16	6	5	2652	1.2	46	- - -	- - -	- - -	
L-1	3800	564	41	13	3	5	5624	2.8	38	(2)40' - 24"1/	- - -	15' R.C. Br.	
L-1	1300	672	47	14	4	5	2171	1.0	41	(2)40' - 30"1/	- - -	15' R.C. Br.	
L-1	3300	1004	66	16	6	5	6732	3.0	46	4' x 4'	- - -	- - -	
L-1	1500	1060	69	16	6	5	3060	1.4	46	15' U.T. Br.	- - -	- - -	
Total-8	15,700						26,899	12.7					11,265.00
M-9	3600	164	15	13	3	5	5328	2.6	38	30' - 24"1/	- - -	30' - 30"	
M-9	4000	292	23	13	3	5	5920	2.9	38	40' - 24"1/	- - -	40' - 36"	
										40' - 24"1/	- - -	- - -	
M-9	3300	460	34	13	3	5	4884	2.4	38	- - -	- - -	- - -	
Total-9	10,900						16,132	7.9					6,673.00
M-10	2800	420	32	13	3	5	4144	2.1	38	- - -	- - -	- - -	
M-10	2000	1372	85	17	7	5	4440	2.0	49	- - -	- - -	- - -	
M-10	3600	1916	112	20	10	5	10,008	4.2	57	30' R.C. Br.	- - -	- - -	
M-10	6000	2344	133	22	12	5	18,900	7.7	62	- - -	- - -	- - -	
M-10	3100	4088	210	30	20	5	14,353	5.6	84	20' - 24"1/	- - -	30' R.C. Br.	
M-10	900	4180	215	32	22	5	4500	1.7	89	(2)20' - 18"1/	- - -	30' R.C. Br.	
M-10	3200	4460	228	32	22	5	16,000	6.1	89	30' - 30"1/	- - -	30' R.C. Br.	
M-10	800	4520	229	32	22	5	4000	1.5	89	- - -	- - -	- - -	
M-10	3600	10,208	455	45	35	5	26,665	9.8	124	45' R.C. Br.	- - -	- - -	
M-10	4000	10,748	470	45	35	5	29,628	10.8	124	45' R.C. Br.	- - -	- - -	
L-1	11,200	776	52	14	4	5	18,704	9.0	41	40' - 24"1/	- - -	15' R.C. Br.	
L-1	1200	808	56	15	5	5	2220	1.0	44	- - -	- - -	- - -	
L-2	3900	208	18	13	3	5	5772	2.9	38	- - -	- - -	- - -	
L-3	3900	572	41	13	3	5	5772	2.9	38	- - -	- - -	- - -	
L-3	1800	1144	73	16	6	5	3672	1.7	46	40' - 24"1/	- - -	15' R.C. Br.	
L-3	4800	1460	89	18	8	5	11,568	5.1	52	- - -	- - -	- - -	
L-4	2900	208	18	13	3	5	4292	2.1	38	40' - 24"1/	- - -	40' - 36"	
L-4	10,600	1148	73	16	6	5	21,624	9.8	46	- - -	- - -	15' R.C. Br.	
L-4	9900	2136	124	22	12	5	31,185	12.7	62	30' R.C. Br.	- - -	- - -	
L-4	12,700	3904	203	30	20	5	58,801	22.7	84	(5)40' - 30"1/ 40' - 36"1/	- - -	30' R.C. Br.	
L-4	7600	5132	257	36	26	5	43,624	16.2	99	Washed out	- - -	45' R.C. Br.	
Total-10	100,500						339,872	137.6					127,127.00
M-11	7600	664	10 2/	13	3	5	11,248	5.6	38	- - -	- - -	- - -	
M-11	4000	3520	42 2/	13	3	5	5920	2.9	38	- - -	- - -	- - -	
M-11	3500	5292	147 3/	22	12	5	11,025	4.5	62	30' R.C. Br.	- - -	- - -	

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 6 - Bloomingvale - Earle - Wee Tee

4-31993 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-11	2600	5544	159 3/	22	12	5	8190	3.3	62	(2)30' - 36"1/	- - -	- - -	
										30' - 24"1/	- - -	- - -	
										30' - 30"1/	- - -	- - -	
										(3)30' - 18"1/	- - -	15' R.C. Br.	
M-11	1300	5608	163 3/	22	12	5	4095	1.7	62	- - -	- - -	- - -	
M-11	2000	6728	214 3/	30	20	5	9260	3.6	84	- - -	- - -	- - -	
L-1	7200	972	14 2/	13	3	5	10,656	5.3	38	- - -	- - -	15' R.C. Br.	
L-1	2800	1388	19 2/	13	3	5	4144	2.1	38	30' - 18"1/	- - -	15' R.C. Br.	
L-1	8800	2596	32 2/	13	3	5	13,024	6.5	38	- - -	- - -	- - -	
L-2	5300	560	40	13	3	5	7844	3.9	38	30' - 30"1/	- - -	30' - 48"	
L-2	3600	970	64	14	4	5	6012	2.9	41	- - -	- - -	- - -	
L-2	7000	1380	86	16	6	5	14,280	6.4	46	- - -	- - -	- - -	
L-3	4500	452	34	13	3	5	6660	3.3	38	20' - 30"1/	- - -	30' - 42"	
										20' - 24"1/	- - -	- - -	
L-3	1900	644	45	14	4	5	3173	1.5	41	20' - 24"1/	- - -	15' R.C. Br.	
										20' - 18"1/	- - -	- - -	
L-3	800	744	52	14	4	5	1336	0.6	41	20' - 24"1/	- - -	15' R.C. Br.	
										20' - 30"1/	- - -	- - -	
L-3	2100	944	62	16	6	5	4284	1.9	46	40' - 30"1/	- - -	15' R.C. Br.	
										40' - 36"1/	- - -	- - -	
L-3	2100	1060	69	16	6	5	4284	1.9	46	40' - 48"1/	- - -	15' R.C. Br.	
L-3	700	1072	70	16	6	5	1428	0.6	46	- - -	- - -	- - -	
Total-11	67,800						126,863	58.5					51,856.00
M-12	3800	748	51	14	4	5	6346	3.1	41	- - -	- - -	- - -	
M-12	3500	1800	77 3/	17	7	5	7770	3.5	49	- - -	- - -	- - -	
M-12	500	2264	83 3/	17	7	5	1110	0.5	49	(2)30' - 30"1/	- - -	15' R.C. Br.	
										(4)30' - 24"1/	- - -	- - -	
M-12	2100	2460	95 3/	18	8	5	5061	2.2	52	(2)30' - 18"1/	- - -	15' R.C. Br.	
										30' - 30"1/	- - -	- - -	
M-12	1100	2528	98 3/	19	9	5	2849	1.2	55	- - -	- - -	- - -	
M-12	500	2900	118 3/	22	12	5	1575	0.6	62	(3)30' - 24"1/	- - -	15' R.C. Br.	
										(3)30' - 18"1/	- - -	- - -	
M-12	5500	3688	155 3/	24	14	5	19,360	7.8	68	- - -	- - -	- - -	
M-12	2300	5200	224 3/	28	18	5	9798	3.8	78	30' U.T. Br.	- - -	- - -	
M-12	2800	5320	228 3/	28	18	5	11,928	4.6	78	- - -	- - -	- - -	
M-12	900	8360	272 3/	36	26	5	5160	1.9	99	60' R.C. Br.	- - -	- - -	
L-1	1500	180	3 2/	13	3	5	2220	1.1	38	20' - 18"1/	- - -	30' - 30"	
L-1	4800	704	11 2/	13	3	5	7104	3.5	38	(2)40' - 24"1/	- - -	15' R.C. Br.	
L-1	2400	808	12 2/	13	3	5	3552	1.8	38	- - -	- - -	- - -	
L-2	5800	336	6 2/	13	3	5	8584	4.3	38	(2)40' - 24"1/	- - -	40' - 42"	
										40' - 24"1/	- - -	- - -	
L-2	3400	452	7 2/	13	3	5	5032	2.5	38	- - -	- - -	- - -	
L-3	4000	348	27	13	3	5	5920	2.9	38	40' - 30"1/	- - -	40' - 42"	

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 6- Bloomingvale - Earle - Wee Tee

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
L-3	1300	360	28	13	3	5	1924	1.0	38	- - -	- - -	- - -	
L-4	2100	1052	67	16	6	5	4284	1.9	46	(2)40' - 36" 1/	- - -	15' R.C. Br.	
L-4	2800	1272	79	16	6	5	5712	2.6	46	- - -	- - -	- - -	
L-5	1200	2452	24 2/	13	3	5	1776	0.9	38	- - -	- - -	15' R.C. Br.	
L-5	5400	2860	35 2/	13	3	5	7992	4.0	38	(2)30' - 24" 1/	- - -	15' R.C. Br.	
L-5	2000	2932	42 3/	13	3	5	2960	1.5	38	- - -	- - -	- - -	
Total-12	59,700						128,017	57.2					52,534.00
M-13	700	268	22	13	3	5	1036	0.5	38	- - -	- - -	30' - 30"	
M-13	4900	660	46	14	4	5	8183	3.9	41	- - -	- - -	- - -	
M-13	4900	1052	68	16	6	5	9996	4.5	46	30' - 24" 1/	- - -	15' R.C. Br.	
										30' - 18" 1/	- - -	- - -	
M-13	4700	1604	98	17	7	5	10,434	4.6	49	(3)40' - 30" 1/	- - -	15' R.C. Br.	
Total-13	15,200						29,649	13.5					12,532.00
M-14	9900	1696	23 2/	13	3	5	14,652	7.3	38	- - -	- - -	- - -	
M-14	5000	2296	65 3/	16	6	5	10,200	4.6	46	- - -	- - -	- - -	
M-14	4900	2908	100 3/	19	9	5	12,691	5.5	55	- - -	- - -	- - -	
M-14	1600	4696	187 3/	28	18	5	6816	2.6	78	- - -	- - -	- - -	
L-1	6200	860	58	14	4	5	10,354	5.0	41	30' - 30" 1/	- - -	15' R.C. Br.	
L-1	2800	1180	75	16	6	5	5712	2.6	46	- - -	- - -	- - -	
Total-14	30,400						60,425	27.6					21,626.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q=10M^{5/6}$.

3/ Runoff curve used: $Q=45M^{5/6}$ for accumulated area applicable + Q curve for segment(s) using other runoff coefficients.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 7 - Kingstree - Cades - Moores

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	500	16	1	13	3	5	740	0.4	38	30' - 18"1/	- - -	30' - 24"	
M-1	1300	60	6	13	3	5	1924	1.0	38	30' - 24"	30' - 24"	- - -	
M-1	2800	108	10	13	3	5	4144	2.1	38	- - -	- - -	- - -	
Total-1	4600						6808	3.5					2,822.00
M-2	4600	2100	121	19	9	5	11,914	5.2	54	(3)40' - 48"1/	- - -	15' R.C. Br.	
M-2	2200	2502	141	20	10	5	6116	2.6	57	- - -	- - -	- - -	
M-2	2200	2904	159	22	12	5	6930	2.8	62	45' C.T. Br.	- - -	- - -	
M-2	2000	2972	162	22	12	5	6300	2.6	62	- - -	- - -	- - -	
Total-2	11,000						31,260	13.2					11,455.00
M-3	2600	416	31	13	3	5	3848	1.9	38	- - -	- - -	- - -	
M-3	2700	832	56	14	4	5	4509	2.2	41	(2)40' - 42"1/	- - -	15' R.C. Br.	
M-3	3900	1296	81	16	6	5	7956	3.6	46	- - -	- - -	- - -	
M-3	3900	1760	104	17	7	5	8658	3.8	49	45' R.C. Br.	- - -	- - -	
Total-3	13,100						24,971	11.5					9,543.00
M-4	1900	3980	Old Kingstree Drainage District Canal, some renovation needed - detailed surveys required to determine design.										
M-4	2600	4104	" "										
M-4	1800	4788	" "										
M-4	5000	5480	" "										
M-4	5000	6172	" "										
M-4	5800	6660	" "										
M-4	7000	11,110	" "										
M-4	800	11,698	" "										
M-4	4000	12,650	" "										
M-4	4000	18,008	" "										
M-4	2300	18,148	" "										
M-4	4000	20,220	" "										
M-4	3300	20,960	" "										
L-1	1300	380	Old Kingstree Drainage District Canal, adequate as constructed, maintenance required.										
L-1	2800	464	" "										
L-2	3700	530	" "										
L-2	3600	690	" "										
L-2	2800	810	" "										
L-2	1900	846	" "										
L-2	1500	3278	Old Kingstree Drainage District Canal, some renovation needed, detailed surveys required to determine design.										
L-2	3300	3490	" "										
L-2	6600	3954	" "										
L-3	6600	2032	" "										
L-3	3300	2304	" "										
L-3	2400	2380	" "										

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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 7 - Kingstree - Cades - Moores

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
L-4	5400	492	Old Kingstree Drainage District Canal, adequate as constructed, maintenance required.										
L-4	600	504	" "				" "	" "	"	"			
L-5	1000	1206	" "				" "	" "	"	"			
L-5	2800	1366	" "				" "	" "	"	"			
L-5	5700	1950	" "				" "	" "	"	"			
L-5	2200	2174	Old Kingstree Drainage District Canal, some renovation needed, detailed surveys required to determine design.										
L-5	6600	3346	" "				" "	" "	"	" "	" "	"	
L-5	6700	4238	" "				" "	" "	"	" "	" "	"	
L-5	7100	4742	" "				" "	" "	"	" "	" "	"	
L-6	2000	584	42	13	3	5	2960	1.5	38	- - -	- - -	- - -	1,040.00
L-6	4600	1408	Old Kingstree Drainage District Canal, adequate as constructed, maintenance required.										
L-6	2700	1752	Old Kingstree Drainage District Canal, some renovation needed, detailed surveys required to determine design.										
L-6	1800	1824	" "				" "	" "	"	" "	" "	"	
Total-4	136,500						2960	1.5					1,040.00
M-5	5100	948	Old Kingstree Drainage District Canal, adequate as constructed, maintenance required.										
M-5	4100	1464	" "				" "	" "	"	"			
M-5	3100	1888	Old Kingstree Drainage District Canal, some renovation needed, detailed surveys required to determine design.										
M-5	5400	2300	" "				" "	" "	"	" "	" "	"	
Total-5	17,700												
M-6	3800	592	Old Kingstree Drainage District Canal, adequate as constructed, maintenance required.										
M-6	6300	1000	" "				" "	" "	"	"			
M-6	7600	1556	Old Kingstree Drainage District Canal, some renovation needed, detailed survey required to determine design.										
M-6	3500	1784	" "				" "	" "	"	" "	" "	"	
Total-6	21,200												
M-7	4700	2636	Old Kingstree Drainage District Canal, some renovation needed, detailed surveys required to determine design.										
M-7	2000	3600	" "				" "	" "	"	" "	" "	"	
M-7	3700	5324	" "				" "	" "	"	" "	" "	"	
M-7	1600	5672	" "				" "	" "	"	" "	" "	"	
M-7	600	5692	" "				" "	" "	"	" "	" "	"	
M-7	2600	5756	" "				" "	" "	"	" "	" "	"	
L-1	4600	468	34	13	3	5	6808	3.4	38	- - -	- - -	- - -	
L-1	3700	908	61	16	6	5	7548	3.4	46	(2)40' - 30"1/	- - -	15' R.C. Br.	
L-1	4000	1144	73	16	6	5	8160	3.7	46	- - -	- - -	- - -	
Total-7	27,500						22,516	10.5					8,729.00
M-8	2300	148	13	13	3	5	3404	1.7	38	40' - 24"1/	- - -	40' - 30"	
M-8	1700	192	16	13	3	5	2516	1.2	38	- - -	- - -	- - -	
M-8	2100	456	34	13	3	5	3108	1.5	38	- - -	- - -	- - -	

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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 7 - Kingstree - Cades - Moores

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
L-1	3200	148	13	13	3	5	4736	2.4	38	- - -	- - -	- - -	
L-1	2000	212	18	13	3	5	2960	1.5	38	40' - 18"1/	- - -	40' - 36"	
Total-8	11,300						16,724	8.3					7,041.00
M-9	4700	204	17	13	3	5	6956	3.5	38	40' - 30"1/	- - -	40' - 36"	
M-9	3800	320	25	13	3	5	5624	2.8	38	- - -	- - -	- - -	
Total-9	8500						12,580	6.3					5,045.00
M-10	3700	636	Old Kingstree Drainage District Canal, adequate as constructed, maintenance required.										
M-10	4300	1080	" "				" "	" "	"	"			
M-10	4600	1408	" "				" "	" "	"	"			
M-10	2500	3384	Old Kingstree Drainage District Canal, some renovation needed, detailed surveys required to determine design.										
M-10	5100	4680	" "				" "	" "	"	" "	" "	"	
L-1	4000	616	43	13	3	5	5920	2.9	38	- - -	- - -	- - -	
L-1	5100	1496	Old Kingstree Drainage District Canal, some renovation needed, detailed surveys required to determine design.										
L-1	5300	1848	" "				" "	" "	"	" "	" "	"	
L-2	2500	484	36	13	3	5	3700	1.8	38	- - -	- - -	- - -	
L-2	5800	920	Old Kingstree Drainage District Canal, adequate as constructed, maintenance required.										
Total-10	42,900						9620	4.7					3,345.00
M-11	2300	224	19	13	3	5	3404	1.7	38	40' - 48"1/	40' - 48"	- - -	
										40' - 48"	- - -	- - -	
M-11	4000	440	33	13	3	5	5920	2.9	38	- - -	- - -	- - -	
M-11	3000	520	38	13	3	5	4440	2.2	38	- - -	- - -	- - -	
M-11	1200	864	58	14	4	5	2004	1.0	41	30' R.C. Br.	- - -	- - -	
M-11	1600	924	61	14	4	5	2672	1.3	41	- - -	- - -	- - -	
L-1	1800	244	20	13	3	5	2664	1.3	38	- - -	- - -	- - -	
Total-11	13,900						21,104	10.4					8,156.00

1/ Remove or abandon (Not included in designed capacity.)

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

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U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
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Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 8 - Kingstree - Boggy Swamp

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	4000	388	30	13	3	5	5920	2.9	38	30' - 30"1/	- - -	30' - 42"	
M-1	2900	548	40	13	3	5	4292	2.1	38	- - -	- - -	- - -	
M-1	1300	952	61	16	6	5	2652	1.2	46	(2)30' - 30"1/	- - -	15' R.C. Br.	
M-1	2600	1032	68	16	6	5	5304	2.4	46	- - -	- - -	- - -	
M-1	4600	1744	103	19	9	5	11,914	5.2	55	(2) 8' x 8'	- - -	- - -	
M-1	1000	1768	105	19	9	5	2590	1.1	55	- - -	- - -	- - -	
L-1	4100	180	15	13	3	5	6068	3.0	38	40' - 18"1/	- - -	40' - 30"	
L-1	2800	256	21	13	3	5	4144	2.1	38	- - -	- - -	- - -	
L-2	2000	196	17	13	3	5	2960	1.5	38	40' - 36"1/ 40' - 24"	40' - 36"	- - -	
L-2	4800	416	32	13	3	5	7104	3.5	38	- - -	- - -	- - -	
Total-1	30,100						52,948	25.0					20,937.00
M-2	5900	492	36	13	3	5	8732	4.3	38	30' - 36"1/	- - -	30' - 48"	
M-2	2700	862	58	15	5	5	4995	2.4	44	- - -	- - -	- - -	
M-2	1000	2062	119	22	12	5	3150	1.3	62	(2)10' x 10'	- - -	- - -	
M-2	900	2122	123	22	12	5	2835	1.2	62	- - -	- - -	- - -	
L-1	4200	660	46	14	4	5	7014	3.4	41	None	- - -	15' R.C. Br.	
L-1	7400	1084	69	16	6	5	15,096	6.8	46	- - -	- - -	- - -	
Total-2	22,100						41,822	19.4					16,115.00
M-3	1400	128	12	13	3	5	2072	1.0	38	(2)30' - 24"1/	- - -	30' - 30"	
M-3	3000	260	21	13	3	5	4440	2.2	38	30' - 30"1/	- - -	30' - 36"	
M-3	2500	428	32	13	3	5	3700	1.8	38	30' - 30"1/	- - -	30' - 42"	
M-3	4000	736	51	14	4	5	6680	3.2	41	30' R.C. Br.	- - -	- - -	
M-3	900	780	53	15	5	5	1665	0.8	44	- - -	- - -	- - -	
Total-3	11,800						18,557	9.0					7,999.00
M-4	7500	428	32	13	3	5	11,100	5.5	38	15' R.C. Br.	- - -	- - -	
M-4	4000	588	42	13	3	5	5920	2.9	38	- - -	- - -	- - -	
Total-4	11,500						17,020	8.4					5,935.00
M-5	3400	180	15	13	3	5	5032	2.5	38	- - -	- - -	- - -	
M-5	6500	892	59	15	5	5	12,025	5.7	44	- - -	- - -	- - -	
M-5	500	1208	76	16	6	5	1020	0.5	46	7' x 7'	- - -	- - -	
M-5	2900	1340	84	17	7	5	6438	2.9	49	- - -	- - -	- - -	
M-5	1200	1180	75	16	6	5	2448	1.1	46	- - -	- - -	- - -	
M-5	2900	2012	116	22	12	5	9135	3.7	62	- - -	- - -	- - -	
L-1	2100	108	10	13	3	5	3108	1.5	38	40' - 24"1/ 40' - 24"1/	40' - 24" - - -	- - -	
L-1	2600	176	15	13	3	5	3848	1.9	38	- - -	- - -	- - -	

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
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ENGINEERING AND DESIGN DATA

Area 8 - Kingstree - Boggy Swamp

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
L-2	1800	88	9	13	3	5	2664	1.3	38	30' - 18"1/	- - -	30' - 24"	
L-2	2100	220	18	13	3	5	3108	1.5	38	30' - 18"1/	- - -	30' - 36"	
L-2	1200	260	21	13	3	5	1776	0.9	38	- - -	- - -	- - -	
L-3	2000	160	13	13	3	5	2960	1.5	38	40' - 24"1/	- - -	40' - 30"	
L-3	1500	184	16	13	3	5	2220	1.1	38	- - -	- - -	- - -	
L-4	3300	176	15	13	3	5	4884	2.4	38	- - -	- - -	- - -	
L-4	3200	704	48	14	4	5	5344	2.6	41	6' x 6'	- - -	- - -	
L-4	2400	880	59	15	5	5	4440	2.1	43	45' R.C. Br.	- - -	- - -	
L-4	500	904	60	16	6	5	1020	0.5	46	- - -	- - -	- - -	
L-5	7400	492	36	13	3	5	10,952	5.4	38	40' - 36"1/	- - -	15' R.C. Br.	
L-5	1000	508	37	13	3	5	1480	0.7	38	- - -	- - -	- - -	
L-6	1300	104	10	13	3	5	1924	1.0	38	30' - 24"	30' - 24"	- - -	
L-6	3000	216	18	13	3	5	4440	2.2	38	- - -	- - -	- - -	
Total-5	51,800						90,266	43.0					33,946.00
M-6	3000	684	48	14	4	5	5010	2.2	41	15' R.C. Br.	- - -	- - -	
M-6	3400	880	59	15	5	5	6290	3.0	44	30' - 36"1/	- - -	15' R.C. Br.	
M-6	5900	1936	113	20	10	5	16,402	6.9	57	(2)40' - 36"1/	- - -	15' R.C. Br.	
M-6	2700	2104	122	22	12	5	8505	3.5	62	- - -	- - -	- - -	
Total-6	15,000						36,207	15.6					14,172.00
M-7	4000	448	33	13	3	5	5920	2.9	38	30' - 30"1/	- - -	30' - 42"	
M-7	1100	480	35	13	3	5	1628	0.8	38	- - -	- - -	- - -	
Total-7	5100						7548	3.7					3,287.00
M-8	300	16	2	13	3	5	444	0.2	38	20' - 12"1/	- - -	30' - 24"	
M-8	3400	212	18	13	3	5	5032	2.5	38	(2) 3' x 8'	- - -	- - -	
M-8	4000	404	31	13	3	5	5920	2.9	38	- - -	- - -	- - -	
Total-8	7700						11,396	5.6					4,209.00
M-9	1800	204	16	13	3	5	2664	1.3	38	4' x 4'	- - -	- - -	
M-9	3200	436	33	13	3	5	4736	2.4	38	- - -	- - -	- - -	
Total-9	5000						7400	3.7					2,590.00
M-10	3900	308	24	13	3	5	5772	2.9	38	40' - 36"	40' - 36"	- - -	
M-10	4100	564	40	13	3	5	6068	3.0	38	None	- - -	15' R.C. Br.	
M-10	2000	580	41	13	3	5	2960	1.5	38	- - -	- - -	- - -	
Total-10	10,000						14,800	7.4					6,660.00

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ENGINEERING AND DESIGN DATA

Area 8 - Kingstree - Boggy Swamp

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CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-11	600	32	4	13	3	5	888	0.4	38	30' - 24"	30' - 24"	- - -	
M-11	5600	264	21	13	3	5	8288	4.1	38	- - -	- - -	- - -	
M-11	1900	588	42	13	3	5	2812	1.4	38	40' - 48"	40' - 48"	- - -	
M-11	1100	624	44	14	4	5	1837	0.9	41	- - -	- - -	- - -	
M-11	1800	744	51	14	4	5	3006	1.4	41	- - -	- - -	- - -	
L-1	2900	92	9	13	3	5	4292	2.1	38	- - -	- - -	- - -	
L-2	2300	80	8	13	3	5	3404	1.7	38	- - -	- - -	- - -	
L-3	2000	56	6	13	3	5	2960	1.5	38	- - -	- - -	- - -	
Total-11	18,200						27,487	13.5					10,552.00
M-12	1600	224	19	13	3	5	2368	1.2	38	(2)30' - 15"1/	- - -	30' - 36"	
M-12	1300	308	24	13	3	5	1924	1.0	38	- - -	- - -	- - -	
Total-12	2900						4292	2.2					1,993.00
M-13	1500	60	6	13	3	5	2220	1.1	38	40' - 30"	40' - 30"	- - -	
M-13	3300	212	18	13	3	5	4884	2.4	38	30' - 18"1/	- - -	30' - 30"	
M-13	1800	244	20	13	3	5	2664	1.3	38	- - -	- - -	- - -	
M-13	3100	1000	66	16	6	5	6324	2.8	46	- - -	- - -	- - -	
M-13	5900	1352	84	17	7	5	13,098	5.8	49	- - -	- - -	- - -	
L-1	3500	356	28	13	3	5	5180	2.6	38	- - -	- - -	- - -	
Total-13	19,100						34,370	16.0					12,652.00
M-14	4500	628	44	14	4	5	7515	3.6	41	40' - 48"1/ 40' - 48"	40' - 48"	- - -	
Total-14	4500						7515	3.6					3,399.00

1/ Remove or abandon (Not included in designed capacity.)

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 9 - Salters - Lane - Gourdin

4-31993 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	4000	600	42	13	3	5	5920	2.9	38	- - -	- - -	- - -	
M-1	1500	964	63	14	4	5	2505	1.2	41	5' x 5'	- - -	- - -	
M-1	800	1028	66	14	4	5	1336	.6	41	30' - 30" 1/	- - -	15' R.C. Br.	
M-1	2200	1112	71	15	5	5	4070	1.9	44	- - -	- - -	- - -	
Total-1	8500						13,831	6.6					5,778.00
M-2	2700	264	21	13	3	5	3996	2.0	38	30' - 18" 1/	- - -	30' - 36"	
M-2	1700	404	29	13	3	5	2516	1.2	38	40' - 48"	40' - 48"	- - -	
M-2	4100	608	43	13	3	5	6068	3.0	38	- - -	- - -	- - -	
M-2	2200	1160	74	15	5	5	4070	1.9	44	8' x 8'	- - -	- - -	
M-2	1800	1244	78	16	6	5	3672	1.7	46	- - -	- - -	- - -	
M-2	4800	1846	108	17	7	5	10,656	4.7	49	- - -	- - -	- - -	
L-1	5000	252	20	13	3	5	7400	3.7	38	- - -	- - -	- - -	
L-2	3400	136	12	13	3	5	5032	2.5	38	40' - 36"	40' - 36"	- - -	
L-2	1400	182	15	13	3	5	2072	1.0	38	40' - 36"	40' - 36"	- - -	
L-2	1800	210	18	13	3	5	2664	1.3	38	- - -	- - -	- - -	
Total-2	28,900						48,146	23.0					18,876.00
M-3	6300	620	44	13	3	5	9324	4.6	38	4' x 4'	- - -	- - -	
M-3	1500	772	52	14	4	5	2504	1.2	41	- - -	- - -	- - -	
M-3	4900	1868	110	18	8	5	11,809	5.2	52	- - -	- - -	- - -	
L-1	2500	184	16	13	3	5	3700	1.8	38	40' - 30"	40' - 30"	- - -	
L-1	4800	412	31	13	3	5	7104	3.5	38	- - -	- - -	- - -	
L-1	3400	756	52	14	4	5	5678	2.7	41	40' - 36" 1/	- - -	15' R.C. Br.	
L-1	2300	840	56	14	4	5	3841	1.9	41	- - -	- - -	- - -	
L-2	5000	172	15	13	3	5	7400	3.7	38	- - -	- - -	- - -	
Total-3	30,700						51,360	24.6					19,200.00
M-4	3000	264	21	13	3	5	4440	2.2	38	40' - 36"	40' - 36"	- - -	
M-4	3500	586	41	13	3	5	5180	2.6	38	- - -	- - -	- - -	
M-4	5700	908	60	14	4	5	9519	4.6	41	- - -	- - -	- - -	
Total-4	12,200						19,139	9.4					7,145.00
M-5	5900	612	43	13	3	5	8732	4.3	38	- - -	- - -	- - -	
M-5	5100	1120	72	16	6	5	10,404	4.7	46	40' - 42" 1/	- - -	15' R.C. Br.	
M-5	3000	1268	79	17	7	5	6660	3.0	49	- - -	- - -	- - -	
M-5	600	2244	128	19	9	5	1554	0.7	55	20' U.T.Br. 1/	- - -	15' R.C. Br.	
M-5	4500	2468	139	20	10	5	12,510	5.3	57	- - -	- - -	- - -	
L-1	4700	472	35	13	3	5	6956	3.5	38	- - -	- - -	- - -	
L-1	4000	788	52	14	4	5	6680	3.2	41	40' - 42" 1/	- - -	15' R.C. Br.	
L-1	2800	908	60	14	4	5	4676	2.2	41	- - -	- - -	- - -	
Total-5	30,600						58,172	26.9					22,923.00

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 9 - Salters - Lane - Gourdin

4-31933 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-6	3700	428	32	13	3	5	5476	2.7	38	(2)20'- 18" 1/	- - -	30' - 42"	
M-6	7500	756	52	14	4	5	12,525	6.0	41	- - -	- - -	- - -	
Total-6	11,200						18,001	8.7					6,900.00
M-7	5000	516	38	13	3	5	7400	3.7	38	(2)30'- 18" 1/	- - -	30' - 48"	
M-7	3300	672	47	14	4	5	5511	2.7	41	- - -	- - -	- - -	
Total-7	8300						12,911	6.4					5,288.00
M-8	4600	144	13	13	3	5	6808	3.4	38	- - -	- - -	- - -	
Total-8	4600						6808	3.4					2,382.00
M-9	4000	216	18	13	3	5	5920	2.9	38	- - -	- - -	- - -	
Total-9	4000						5920	2.9					2,060.00
M-10	4000	404	31	13	3	5	5920	2.9	38	4' x 4'	- - -	- - -	
M-10	6700	612	43	13	3	5	9916	4.9	38	- - -	- - -	- - -	
Total-10	10,700						15,836	7.8					5,519.00
M-11		2688	33 2/	Adequate as constructed - requires maintenance.									
M-11	2100	3144	67 3/	15	5	5	3885	1.8	44	30' R.C. Br.	- - -	- - -	
M-11	1800	3232	72 3/	15	5	5	3330	1.6	44	20' U.T. Br.	- - -	15' R.C. Br.	
M-11	1500	3332	78 3/	16	6	5	3060	1.4	46	- - -	- - -	- - -	
M-11	4000	4856	158 3/	22	12	5	12,600	5.1	62	- - -	- - -	- - -	
M-11	5000	6952	218 3/	26	16	5	19,450	7.7	73	- - -	- - -	- - -	
M-11	7100	7780	253 3/	30	20	5	32,873	12.7	84	- - -	- - -	- - -	
L-1	4000	624	44	14	4	5	6680	3.2	41	- - -	- - -	- - -	
L-1	4300	888	59	15	5	5	7955	3.8	44	- - -	- - -	- - -	
L-2		1168	17 2/	Adequate as constructed - requires maintenance.									
Total-11	29,800						89,833	37.3					31,219.00
M-12	7700	600	42	13	3	5	11,396	5.7	38	- - -	- - -	- - -	
M-12	2000	820	55	13	3	5	2960	1.5	38	None	- - -	15' R.C. Br.	
M-12	300	920	60	14	4	5	501	0.2	41	40' - 24" 1/	- - -	15' R.C. Br.	
M-12	1300	1040	67	15	5	5	2405	1.1	44	(2)40'- 30" 1/	- - -	15' R.C. Br.	
M-12	1000	1112	71	15	5	5	1850	0.9	44	- - -	- - -	- - -	
Total-12	12,300						19,112	9.4					9,658.00
M-13	1900	180	10	13	3	5	2812	1.4	38	40' - 24" 1/	- - -	40' - 30"	
M-13	4500	416	32	13	3	5	6660	3.3	38	- - -	- - -	- - -	

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 9 - Salters - Lane - Gourdin

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-13	1800	1472	90	16	6	5	3672	1.7	46	- - -	- - -	- - -	
L-1		712		Adequate as constructed - requires maintenance.									
L-1	4000	1304	81	16	6	5	8160	3.7	46	- - -	- - -	- - -	
Total-13	12,200						21,304	10.1					7,786.00
M-14	3500	372	28	13	3	5	5180	2.6	38	None	- - -	30' - 32"	
M-14	6900	760	52	14	4	5	11,523	5.5	41	- - -	- - -	- - -	
Total-14	10,400						16,703	8.1					6,456.00
M-15		88		Adequate as constructed - requires maintenance.									
M-15	4100	2332	131	22	12	5	12,915	5.3	62	- - -	- - -	- - -	
M-15	7600	3352	178	24	14	5	26,752	10.8	68	5' x 4' 1/	- - -	30' R.C. Br.	
M-15	6500	3704	194	24	14	5	22,880	9.3	68	- - -	- - -	- - -	
L-1	7100	572	41	13	3	5	10,508	5.2	38	- - -	- - -	- - -	
L-1	3700	780	54	15	5	5	6845	3.2	44	- - -	- - -	- - -	
L-1	500	1344	84	17	7	5	1110	0.5	49	(2)40' - 36" 1/	- - -	15' R. C. Br.	
L-1	2300	1448	88	18	8	5	5545	2.4	52	- - -	- - -	- - -	
L-1	1700	1916	112	20	10	5	4726	2.0	57	- - -	- - -	- - -	
L-2	1700	208	18	13	3	5	2516	1.2	38	None	- - -	30' - 36"	
L-2	5600	524	38	13	3	5	8288	4.1	38	- - -	- - -	- - -	
L-3	4700	412	31	13	3	5	6956	3.5	38	- - -	- - -	- - -	
L-4	2800	156	14	13	3	5	4144	2.1	38	- - -	- - -	- - -	
Total-15	48,300						113,185	49.6					41,697.00
M-16	6500	424	32	13	3	5	9620	4.8	38	40' - 36" 1/	- - -	40' - 42"	
M-16	1100	452	34	13	3	5	1628	0.8	38	- - -	- - -	- - -	
Total-16	7600						11,248	5.6					4,812.00
M-17	5400	452	34	13	3	5	7992	4.0	38	- - -	- - -	- - -	
M-17	1700	1146	73	15	5	5	3145	1.5	44	- - -	- - -	- - -	
M-17	1700	1368	85	16	6	5	3468	1.6	46	- - -	- - -	- - -	
L-1	6100	472	35	13	3	5	9028	4.5	38	- - -	- - -	- - -	
Total-17	14,900						23,633	11.6					8,228.00
M-18	6600	392	29	13	3	5	9768	4.8	38	- - -	- - -	- - -	
M-18	4600	1048	68	15	5	5	8510	4.0	44	- - -	- - -	- - -	
M-18	2900	2048	118	18	8	5	6989	3.1	52	None	- - -	15' R.C. Br.	
M-18	4800	2592	144	20	10	5	13,344	5.6	57	20' - 15" 1/	- - -	15' R.C. Br.	
M-18	3300	2936	161	22	12	5	10,395	4.2	62	(2)40' - 36" 1/	- - -	30' R.C. Br.	
M-18	5500	3196	172	24	14	5	19,360	7.8	68	- - -	- - -	- - -	

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U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

ENGINEERING AND DESIGN DATA

Area 9 - Salters - Lane - Gourdin -

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
L-1	4400	384	29	13	3	5	6512	3.2	38	- - -	- - -	- - -	
L-2	1800	272	22	13	3	5	2664	1.3	38	None	- - -	30' - 36"	
L-2	55	760	52	14	4	5	9185	4.4	41	- - -	- - -	- - -	
Total-18	39,400						86,727	38.4					33,842.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q = 10 M^{5/6}$.

3/ Runoff curve used: $Q = 45 M^{5/6}$ for accumulated area applicable + Q curve for segment (s) using other runoff coefficients.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 10 - Hebron - Mouzon - Bennett Swamp

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	10,200	728	11 2/	13	3	5	15,096	7.4	38	- - -	- - -	- - -	
M-1	3200	1032	35 3/	13	3	5	4736	2.4	38	- - -	- - -	- - -	
M-1	2400	2160	65 3/	16	6	5	4896	2.2	46	- - -	- - -	- - -	
L-1	7400	844	13 2/	13	3	5	10,952	5.4	38	- - -	- - -	- - -	
L-1	2300	952	23 3/	13	3	5	3404	1.7	38	- - -	- - -	- - -	
Total-1	25,500						39,084	19.1					13,591.00
M-2	6700	972	64	16	6	5	13,668	6.2	46	- - -	- - -	- - -	
M-2	5400	1300	81	17	7	5	11,988	5.3	49	40' - 36" 1/	- - -	15' R.C. Br.	
										40' - 24" 1/	- - -	- - -	
M-2	5300	2016	117	18	8	5	12,773	5.6	52	- - -	- - -	- - -	
Total-2	17,400						38,429	17.1					14,027.00
M-3	5000	808	13 2/	13	3	5	7400	3.7	38	- - -	- - -	- - -	
M-3	5300	1424	56 3/	14	4	5	8851	4.3	41	(2)40' - 30" 1/	- - -	15' R.C. Br.	
M-3	5300	1676	71 3/	15	5	5	9805	4.6	44	- - -	- - -	- - -	
Total-3	15,600						26,056	12.6					10,034.00
M-4	7000	544	39	13	3	5	10,360	5.1	38	40' - 30" 1/	- - -	15' R.C. Br.	
M-4	2700	616	43	13	3	5	3996	2.0	38	- - -	- - -	- - -	
Total-4	9700						14,356	7.1					6,009.00
M-5	5300	840	13 2/	13	3	5	7844	3.9	38	- - -	- - -	- - -	
M-5	4100	1136	16 2/	13	3	5	6068	3.0	38	40' - 24" 1/	- - -	15' R.C. Br.	
M-5	3300	1280	29 3/	13	3	5	4834	2.4	38	- - -	- - -	- - -	
M-5	2200	2000	74 3/	15	5	5	4070	1.9	44	- - -	- - -	- - -	
L-1	5300	368	28	13	3	5	7844	3.9	38	40' - 24" 1/	- - -	40' - 42"	
L-1	4000	600	42	13	3	5	5920	2.9	38	- - -	- - -	- - -	
Total-5	24,200						36,630	18.0					14,637.00
M-6	6000	296	23	13	3	5	8880	4.4	38	40' - 36"	40' - 36"	- - -	
M-6	1800	368	28	13	3	5	2664	1.3	38	30' - 30" 1/	- - -	30' - 42"	
M-6	500	380	29	13	3	5	740	0.4	38	- - -	- - -	- - -	
Total-6	8300						12,284	6.1					5,431.00
M-7	4100	216	18	13	3	5	6068	3.0	38	(2)30' - 24"	(2)30' - 24"	- - -	
M-7	1900	292	23	13	3	5	2812	1.4	38	40' - 42"	40' - 42"	- - -	
M-7	1400	312	24	13	3	5	2072	1.0	38	- - -	- - -	- - -	
Total-7	7400						10,952	5.4					4,858.00

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U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
USDA SCS-FORT WORTH TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 10 - Hebron - Mouzon - Bennett Swamp

4-319(3) 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-8	3800	468	34	13	3	5	5624	2.8	38	- - -	- - -	- - -	
M-8	3500	976	64	16	6	5	7140	3.2	46	- - -	- - -	- - -	
M-8	4600	1516	92	18	8	5	11,086	4.9	52	- - -	- - -	- - -	
Total-8	11,300						23,850	10.9					8,142.00
M-9	9600	1272	Old County Line Canal - Adequate as constructed - maintenance required.										
M-9	2900	2278	28 2/	13	3	5	4292	2.1	38	20' - 15"1/	- - -	15' R.C. Br.	
M-9	3100	2532	32 2/	13	3	5	4588	2.3	38	- - -	- - -	- - -	
M-9	3300	2648	43 3/	13	3	5	4884	2.4	38	- - -	- - -	- - -	
M-9	2100	3824	93 3/	18	8	5	5061	2.2	52	- - -	- - -	- - -	
L-1	6900	756	Old County Line Canal - Adequate as constructed - maintenance required.										
L-2	2400	368	6 2/	13	3	5	3553	1.8	38	(2)30' - 15"1/	- - -	30' - 42"	
L-2	4500	848	13 2/	13	3	5	6660	3.3	38	20' - 18"1/	- - -	15' R.C. Br.	
L-2	1000	928	14 2/	13	3	5	1480	0.7	38	- - -	- - -	- - -	
L-2	1900	1088	28 3/	13	3	5	2812	1.4	38	- - -	- - -	- - -	
Total-9	37,700						33,330	16.2					14,232.00
M-10	5300	452	33	13	3	5	7844	3.9	38	(2)40' - 24"1/	- - -	40' - 42"	
M-10	2600	540	39	13	3	5	3848	1.9	38	- - -	- - -	- - -	
Total-10	7900						11,692	5.8					4,963.00
M-11	4000	284	22	13	3	5	5920	2.9	38	40' - 36"	40' - 36"	- - -	
M-11	1200	296	23	13	3	5	1776	0.9	38	- - -	- - -	- - -	
Total-11	5200						7696	3.8					3,164.00
M-12	7900	728	50	14	4	5	13,193	6.3	41	15' R.C. Br.	- - -	- - -	
M-12	3300	1008	66	16	6	5	6732	3.0	46	- - -	- - -	- - -	
M-12	5300	1596	97	19	9	5	13,727	6.0	55	45' R.C.Br.	- - -	- - -	
M-12	1500	1664	104	19	9	5	3885	1.7	55	- - -	- - -	- - -	
L-1	4500	256	21	13	3	5	6660	3.3	38	40' - 30"1/	- - -	40' - 36"	
L-1	2900	484	36	13	3	5	4292	2.1	38	- - -	- - -	- - -	
L-1	4400	764	52	14	4	5	7348	3.5	41	- - -	- - -	- - -	
Total-12	29,800						55,837	25.9					19,779.00
M-13	2500	250	20	13	3	5	3700	1.8	38	30' - 18"1/	- - -	30' - 36"	
M-13	3000	590	41	13	3	5	4440	2.2	38	- - -	- - -	- - -	
M-13	2900	930	62	16	6	5	5916	2.7	46	30' - 30"1/	- - -	15' R.C. Br.	
										30' - 24"1/	- - -	- - -	
M-13	4300	1342	84	17	7	5	9546	4.2	49	- - -	- - -	- - -	
M-13	4400	1754	104	19	9	5	10,604	4.9	55	(3)10' x 10'	- - -	- - -	

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 10 - Hebron - Mouzon - Bennett Swamp

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-13	2200	1886	111	20	10	5	6116	2.6	57	- - -	- - -	- - -	
Total-13	19,300						40,322	18.4					15,200.00
M-14	4400	308	24	13	3	5	6512	3.2	38	40' - 18"1/	- - -	40' - 36"	
										40' - 30"1/	- - -	- - -	
M-14	3000	792	54	15	5	5	5550	2.6	44	7' x 6'	- - -	- - -	
M-14	1200	828	55	15	5	5	2220	1.0	44	- - -	- - -	- - -	
M-14	3800	3040	166	22	12	5	11,970	4.9	62	- - -	- - -	- - -	
L-1	1600	216	18	13	3	5	2368	1.2	38	20' - 18"1/	- - -	30' - 36"	
L-1	4800	656	45	14	4	5	8016	3.9	41	40' - 24"1/	- - -	15' R.C. Br.	
L-1	2600	804	55	15	5	5	4810	2.3	44	30' - 30"1/	- - -	15' R.C. Br.	
L-1	1000	944	62	16	6	5	2040	0.9	46	30' - 30"1/	- - -	15' R.C. Br.	
L-1	600	984	65	16	6	5	1224	0.6	46	30' - 30"1/	- - -	15' R.C. Br.	
L-1	800	1016	66	16	6	5	1632	0.7	46	30' - 30"1/	- - -	15' R.C. Br.	
L-1	3000	1290	80	17	7	5	6660	3.0	49	(2)40' - 36"1/	- - -	15' R.C. Br.	
L-1	2300	1564	95	18	8	5	5543	2.4	52	- - -	- - -	- - -	
L-1	3400	1820	108	20	10	5	9452	4.0	57	- - -	- - -	- - -	
Total-14	32,500						67,997	30.7					30,259.00
M-15	4600	268	22	13	3	5	6808	3.4	38	20' - 15"1/	- - -	30' - 36"	
M-15	4100	504	37	13	3	5	6068	3.0	38	- - -	- - -	- - -	
Total-15	8700						12,876	6.4					4,979.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q = 10 M^{5/6}$.

3/ Runoff curve used: $Q = 45 M^{5/6}$ for accumulated area applicable + Q curve for segment(s) using other runoff coefficients.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 11 - Greeleyville - Heineman

4-31933 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-1	6800	624	10 2/	13	3	5	10,064	5.0	38	- - -	- - -	- - -	
M-1	1900	1528	21 2/	13	3	5	2812	1.4	38	- - -	- - -	- - -	
M-1	3000	2040	57 3/	15	5	5	5550	2.6	44	- - -	- - -	- - -	
M-1	1500	3104	116 3/	22	12	5	4725	1.9	62	45' R.C. Br.	- - -	- - -	
M-1	3900	3664	143 3/	24	14	5	13,728	5.6	68	- - -	- - -	- - -	
M-1	2600	4192	168 3/	26	16	5	10,114	4.0	73	(2)40' - 60" 1/	- - -	30' R.C. Br.	
M-1	4800	4848	197 3/	30	20	5	22,224	8.6	84	- - -	- - -	- - -	
M-1	1000	5256	217 3/	32	22	5	5000	1.9	89	- - -	- - -	- - -	
L-1	1500	248	10 2/	13	3	5	2220	1.1	38	20' - 15"	- - -	30' - 36"	
L-1	3500	392	7 2/	13	3	5	5180	2.6	38	- - -	- - -	- - -	
L-2	3800	188	16	13	3	5	5624	2.8	38	(2)20' - 15" 1/	- - -	30' - 36"	
L-2	3600	384	29	13	3	5	5328	2.6	38	- - -	- - -	- - -	
L-3	5700	600	43	13	3	5	8436	4.2	38	- - -	- - -	- - -	
L-3	4000	776	53	15	5	5	7400	3.5	44	- - -	- - -	- - -	
L-4	5900	352	27	13	3	5	8732	4.3	38	- - -	- - -	- - -	
Total-1	53,500						117,137	52.1					42,664.00
M-2	4200	300	24	13	3	5	6216	3.1	38	4' x 4'	- - -	- - -	
M-2	1200	320	25	13	3	5	1776	0.9	38	- - -	- - -	- - -	
Total-2	5400						7992	4.0					2,798.00
M-3	3800	1076	43 3/	13	3	5	5624	2.8	38	(4)30' - 30" 1/	- - -	15' R.C. Br.	
M-3	700	1160	48 3/	14	4	5	1169	0.6	41	- - -	- - -	- - -	
M-3	2500	2552	87 3/	18	8	5	6025	2.6	52	30' U.T. Br.	- - -	- - -	
M-3	3400	3092		Canal adequate as constructed - maintenance required.									
L-1	6300	588		"	"	"	"	"	"				
L-1	300	648		"	"	"	"	"	"				
L-1	5000	964		"	"	"	"	"	"				
L-1	1200	1115		"	"	"	"	"	"				
L-1	500	1120		"	"	"	"	"	"				
L-2	2400	96	9	13	3	5	740	0.4	38	- - -	- - -	- - -	
Total-3	21,600						16,370	7.8					6,652.00
M-4	3500	620	43	13	3	5	5180	2.6	38	- - -	- - -	- - -	
M-4	3300	848	57	15	5	5	6105	2.9	44	- - -	- - -	- - -	
M-4	3200	1080	69	16	6	5	6528	2.9	46	- - -	- - -	- - -	
M-4	3200	1328	83	17	7	5	7104	3.2	49	None	- - -	15' R.C. Br.	
M-4	4000	1572	96	19	9	5	10,360	4.5	55	- - -	- - -	- - -	
M-4	1300	1856	110	20	10	5	3614	1.5	57	- - -	- - -	- - -	
M-4	1700	2412	136	24	14	5	5984	2.4	68	40' - 24" 1/	- - -	30' R.C. Br.	
M-4	800	2436	137	24	14	5	2816	1.1	68	- - -	- - -	- - -	
M-4	400	2656	147	24	14	5	1408	0.6	68	30' - 36" 1/	- - -	30' R.C. Br.	

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH TEX 1970

Work Sheet 3-70 4-R-29076-A

ENGINEERING AND DESIGN DATA

Area 11 - Greeleyville - Heineman

4-31983 7-72

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-4	6300	3344	177	28	18	5	26,838	10.4	78	- - -	- - -	- - -	
L-1	4400	236	20	13	3	5	6512	3.2	38	- - -	- - -	- - -	
L-2	5100	376	30	13	3	5	7548	3.7	38	30' - 18" 1/	- - -	30' - 42"	
L-3	500	48	5	13	3	5	740	0.4	38	40' - 24"	40' - 24"	- - -	
L-3	3200	208	17	13	3	5	4736	2.4	38	- - -	- - -	- - -	
Total-4	40,900						95,473	41.8					38,128.00
M-5	5200	656	10 2/	13	3	5	7696	3.8	38	- - -	- - -	- - -	
M-5	6600	1736	79 3/	17	7	5	14,652	6.5	49	- - -	- - -	- - -	
M-5	500	2076	99 3/	19	9	5	1295	0.6	55	45' R.C. Br.	- - -	- - -	
L-1	4500	440	33	13	3	5	6660	3.3	38	- - -	- - -	- - -	
L-1	3000	656	46	14	4	5	5010	2.4	41	- - -	- - -	- - -	
L-2	6700	324	25	13	3	5	9916	4.9	38	- - -	- - -	- - -	
Total-5	26,500						45,229	21.5					15,607.00
M-6	1500	180	15	13	3	5	2220	1.1	38	None	- - -	40' - 36"	
M-6	2000	260	21	13	3	5	2960	1.5	38	- - -	- - -	- - -	
M-6	4800	748	51	14	4	5	8016	3.9	41	30' - 24" 1/	- - -	15' R.C. Br.	
M-6	1500	788	54	15	5	5	2775	1.3	44	- - -	- - -	- - -	
L-1	4500	176	15	13	3	5	6660	3.3	38	- - -	- - -	- - -	
Total-6	14,300						22,631	11.1					9,518.00
M-7	1500	108		Canal adequate as constructed - maintenance required.									
M-7	200	132		"	"	"	"	"	"				
M-7	2200	224		"	"	"	"	"	"				
M-7	2600	304		"	"	"	"	"	"				
Total-7													
M-8	2000	140	13	13	3	5	2960	1.5	38	- - -	- - -	- - -	
M-8	3000	412	57 3/	15	5	5	5550	2.6	42	30' - 15" 1/	- - -	30' - 42"	
M-8	1400	652	72 3/	16	6	5	2856	1.3	46	4' x 4'	- - -	- - -	
M-8	2500	748	78 3/	17	7	5	5550	2.5	49	- - -	- - -	- - -	
L-1	1800	76	19 4/	13	3	5	2664	1.3	38	None	- - -	30' - 24"	
L-1	2500	156	36 4/	13	3	5	3700	2.7	38	- - -	- - -	- - -	
Total-8	13,200						23,280	11.9					9,099.00
M-9	5800	532	38	13	3	5	8584	4.3	38	- - -	- - -	- - -	
M-9	3400	1376	86	18	8	5	8194	3.6	52	- - -	- - -	- - -	
M-9	3000	2088	121	22	12	5	9450	3.9	62	(2)30' - 36" 1/	- - -	30' R.C. Br.	
M-9	1000	2172	125	22	12	5	3150	1.3	62	(5)40' - 48"	- - -	- - -	

U. S. DEPARTMENT OF AGRICULTURE; SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX. 1970

ENGINEERING AND DESIGN DATA

Area 11 - Greeleyville - Heineman

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS EXISTING Length & Size (11)	CULVERTS LOWERING Length & Size (12)	CULVERTS & BRIDGES-NEW Length & Size (13)	TOTAL ESTIMATED COST DOLLARS (14)
M-9	1100	2232	127	22	12	5	3465	1.4	62	- - -	- - -	- - -	
M-9	900	2984	163	26	16	5	3501	1.4	73	(2)30' - 30"1/	- - -	30'R.C. Br.	
										30' - 36"1/	- - -	- - -	
M-9	2000	3048	167	26	16	5	7780	3.1	73	- - -	- - -	- - -	
M-9	1400	5092	255	34	24	5	7518	2.8	94	(2) 8' x 8'	- - -	- - -	
L-1	3200	280	23	13	3	5	4736	2.4	38	30' - 24"1/	- - -	30' - 36"	
L-1	2900	460	34	13	3	5	4292	2.1	38	- - -	- - -	- - -	
L-2	1300	80	7	13	3	5	1924	1.0	38	30' - 18"1/	- - -	30' - 24"	
L-2	2900	180	15	13	3	5	4292	2.1	38	- - -	- - -	- - -	
L-3	3000	208	17	13	3	5	4440	2.2	38	4' x 4'	- - -	- - -	
L-3	5100	528	38	13	3	5	7548	3.7	38	- - -	- - -	- - -	
L-4	5300	540	39	13	3	5	7844	3.9	38	40' - 60"	- - -	- - -	
L-4	1100	604	43	13	3	5	1628	0.8	38	- - -	- - -	- - -	
L-5	6100	544	39	13	3	5	9028	4.5	38	None	- - -	30' - 48"	
L-5	1600	636	43	13	3	5	2368	1.2	38	(2)30' - 18"1/	- - -	15' R.C. Br.	
L-5	2100	660	46	14	4	5	3507	1.7	41	- - -	- - -	- - -	
L-6	3400	808	55	15	5	5	6290	3.0	44	40' - 18"1/	- - -	15' R.C. Br.	
L-6	1000	844	57	15	5	5	1850	0.9	44	None	- - -	15' R.C. Br.	
L-6	4800	976	64	16	6	5	9792	4.4	46	- - -	- - -	- - -	
Total-9	62,400						121,181	55.7					49,935.00
M-10	7500	540	39	13	3	5	11,100	5.5	38	30' - 18"1/	- - -	30' - 48"	
M-10	2000	676	47	14	4	5	3340	1.6	41	40' - 36"1/	- - -	15' R.C. Br.	
Total-10	9500						14,440	7.1					6,810.00
M-11	4000	416	31	13	3	5	5920	2.9	38	6' x 8'	- - -	- - -	
Total-11	4000						5920	2.9					2,060.00

1/ Remove or abandon (Not included in designed capacity.)

2/ Runoff curve used: $Q = 10\,M^{5/6}$.

3/ Runoff curve used: $Q = 45\,M^{5/6}$ for accumulated area applicable + Q curve for segment(s) using other runoff coefficients.

4/ Runoff curve used: $Q = 118\,M^{5/6}$.

NOTE: Figure in parenthesis in column 11 indicates number of culverts.

4-31983 7-72

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
USDA-SCS-FORT WORTH, TEX 1970

Work Sheet 3-70 4-R-29076-A

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAIN

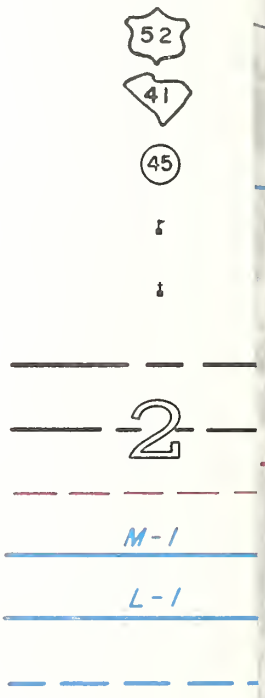


Figure No. 3

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS
WILLIAMSBURG COUNTY, SOUTH CAROLINA

0 5 10 MILES

INDEX TO MAP SHEETS

AGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

ONVENTIONAL SIGNS

— Primary Road System

Federal Highway

State Highway

County Road

School

Church

— County Line

— Planning Unit Boundary and Number

– – Watershed Boundary

Main

Lateral

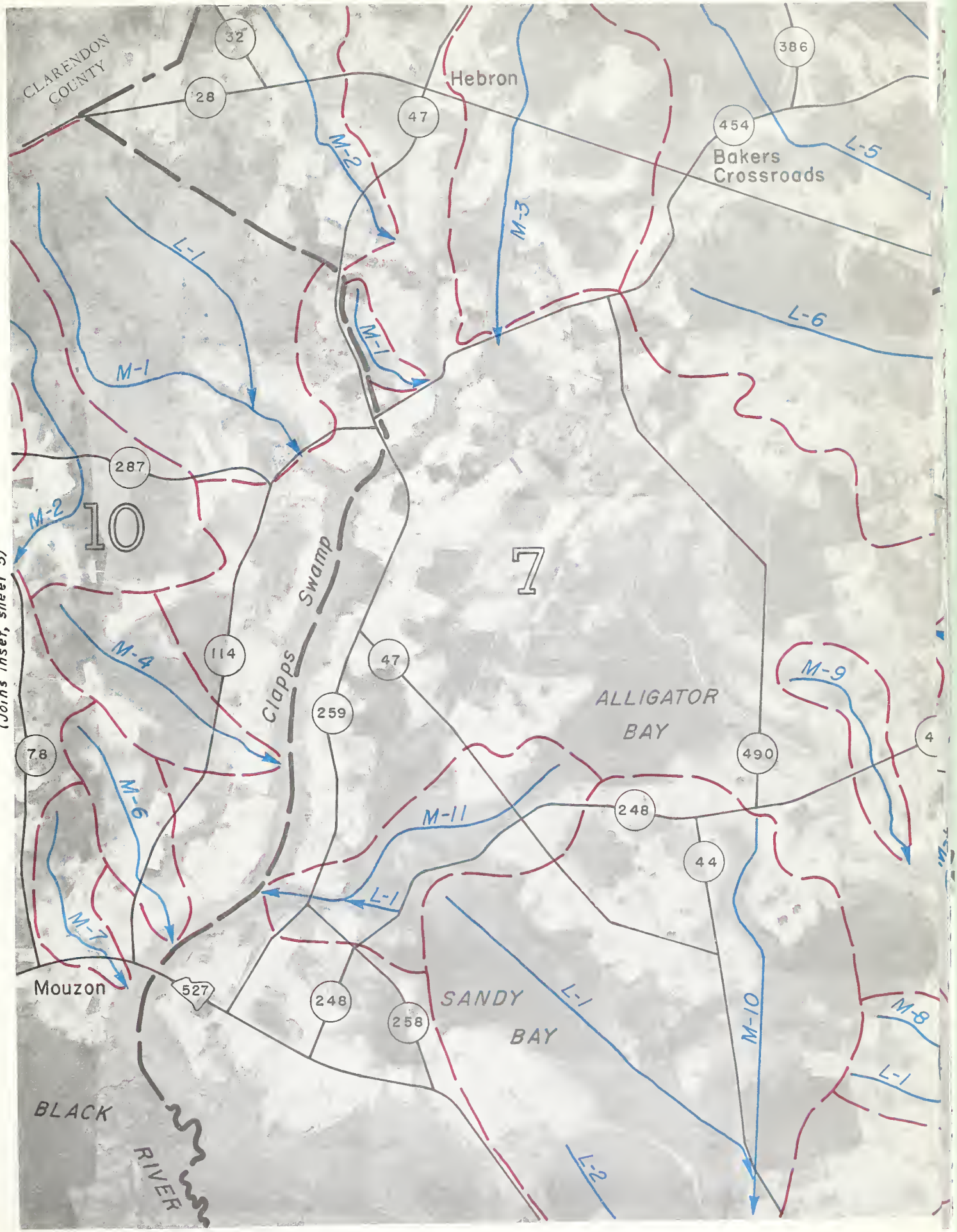
Indicates existing canals or natural drainage in swamp

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE

(Joins sheet 1)

2

N



(Joins inset, sheet 5)

0 1/2 1 Mile

Scale 1:50 000 (Approximate)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

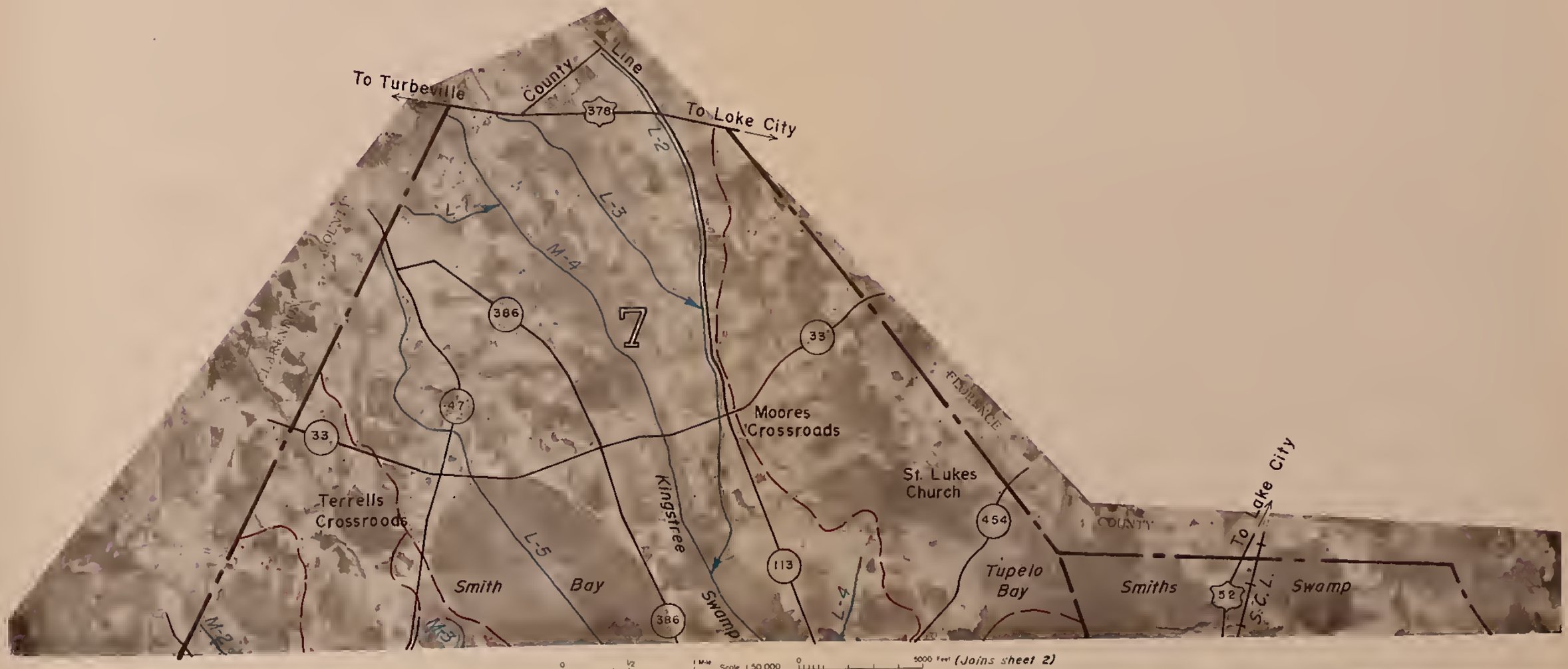
CONVENTIONAL SIGNS

- Primary Road System
- 52 — Federal Highway
- 41 — State Highway
- 45 — County Road
- School
- Church
- County Line
- 2 — Planning Unit Boundary and Number
- Watershed Boundary
- M-1 — Main
- L-1 — Lateral
- Indicates existing canals or natural drainage in swamp

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

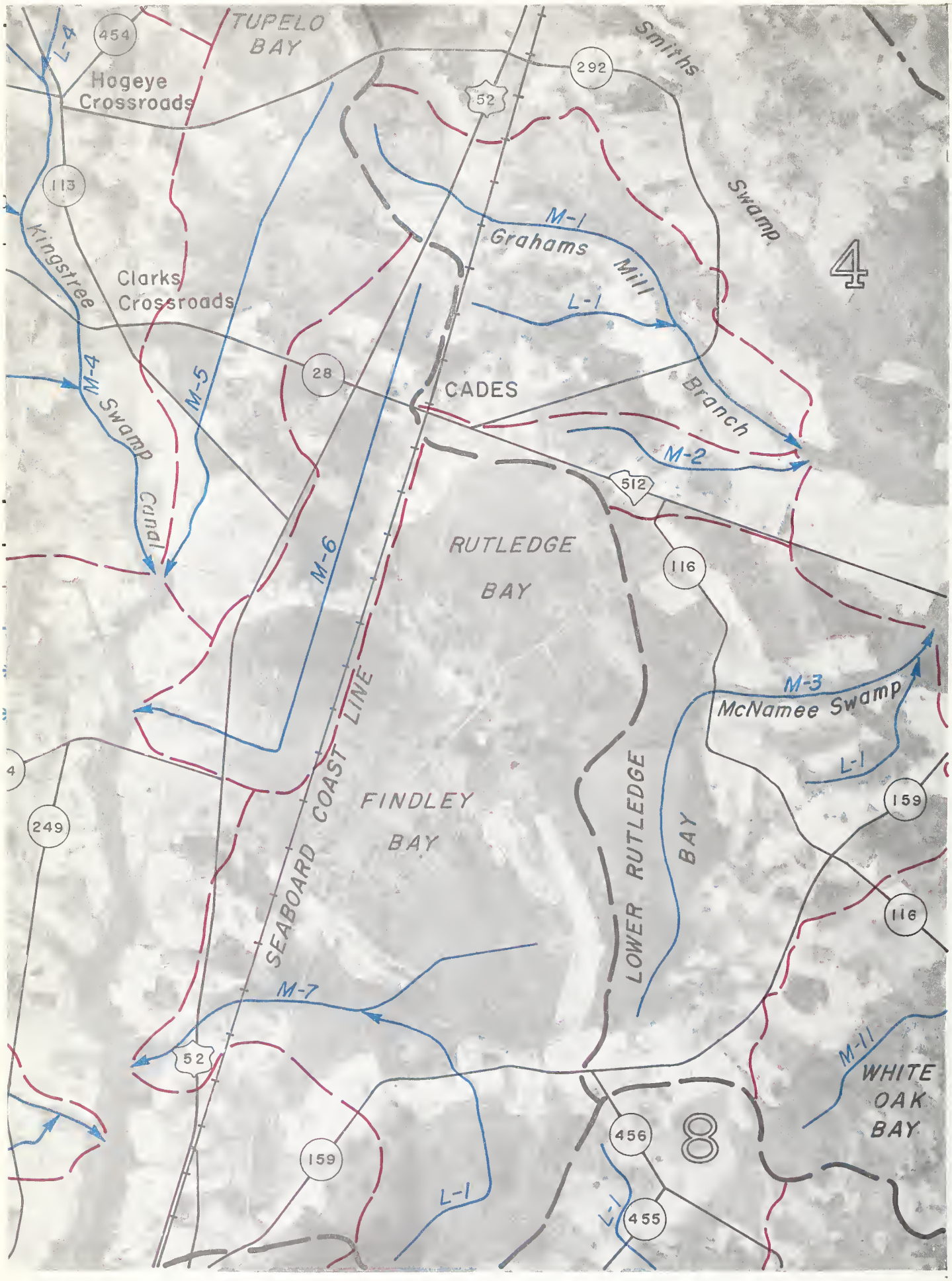
(1)

N



This is one set of maps prepared by the Soil Conservation Service, U.S. Department of Agriculture, for a feasibility study of requirements for main ditch drainage canals in Williamsburg County, South Carolina. The maps have been prepared in cooperation with Williamsburg County Soil and Water Conservation District and under the financial sponsorship of Williamsburg County. For information regarding the complete feasibility study report, write the Soil Conservation Service, U.S. Department of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1966. Maps were prepared and surveys executed in 1972.

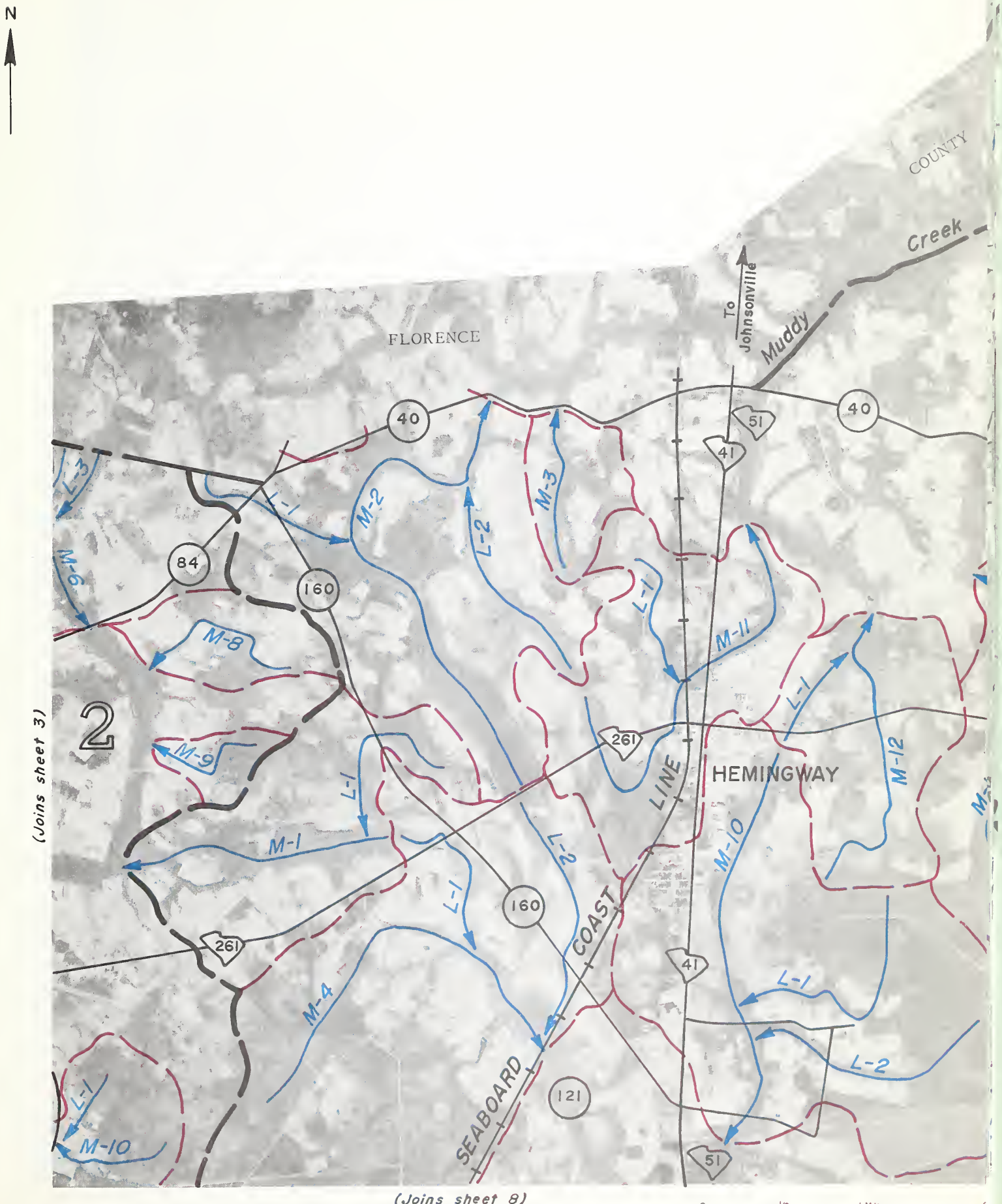
GE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA



(Joins sheet 3)

(Joins sheet 6)

5000 Feet


N
COUNTY
Creek
To Johnsonville
Muddy
FLORENCE
40
51
41
40
L-3
L-1
M-2
L-2
M-3
84
160
M-6
M-8
L-1
M-11
M-9
261
HEMINGWAY
L-1
M-12
L-1
M-1
L-2
LINE
M-10
160
COAST
261
41
M-4
L-1
L-2
SEABOARD
121
L-1
M-10
51
2
(Joins sheet 3)
(Joins sheet 8)
0
1/2
1 Mile
Scale 1:50 000
(Approximate)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(2)

(Joins sheet 1)

N

(Joins inset, sheet 5)

(Joins sheet 3)

(Joins sheet 6)

Scale 1:50 000 (Approximate)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

N

Swamp
Lake
52
Roper's Crossroads
159
39
M-7
M-8
Swamp
Singleton
M-5
M-6
M-4
159
504
512
4
L-1
L-2
L-3
M-1
M-2
M-3
118
Bartells Crossroads
84
85
L-1
L-2
M-9
L-1
M-10
Jones Swamp
White Oak Swamp
M-11
Cooper Tower
116
L
M-9
L-2
Paisley Swamp
Mc Knight Swamp
M-12
M-13
M-14
M-15
8
52
118
512
Boggy Swamp
M-7
2
39
290
261
COOPERS
261
Swamp
85
51
INDIANTOWN
Indian Town
512
(Joins sheet 7)
(Joins sheet 4)
(Joins sheet 2)

0 ½ Mile
Scale 1:50 000 (Approximate)
0 5000 Feet

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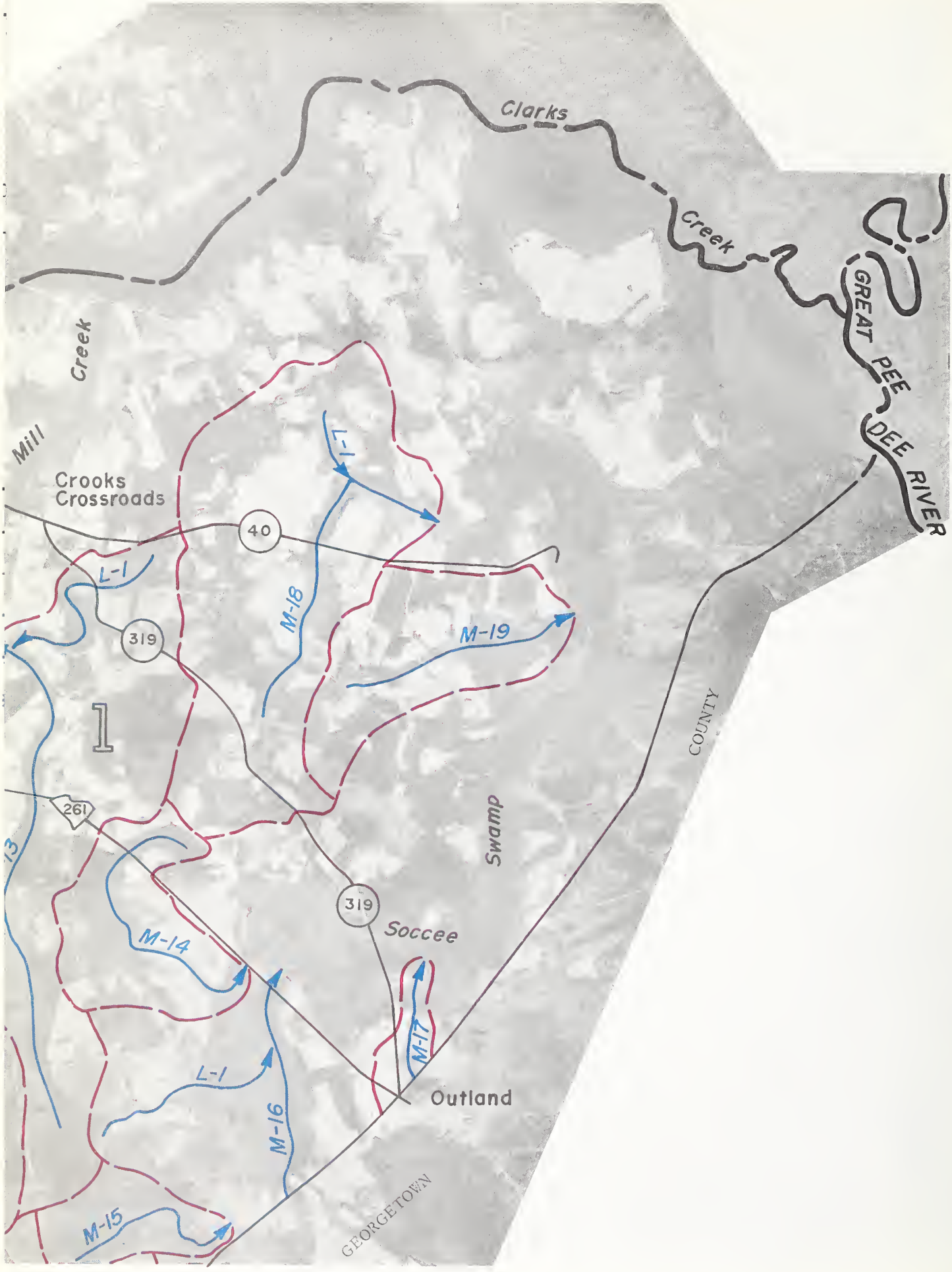
GE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA



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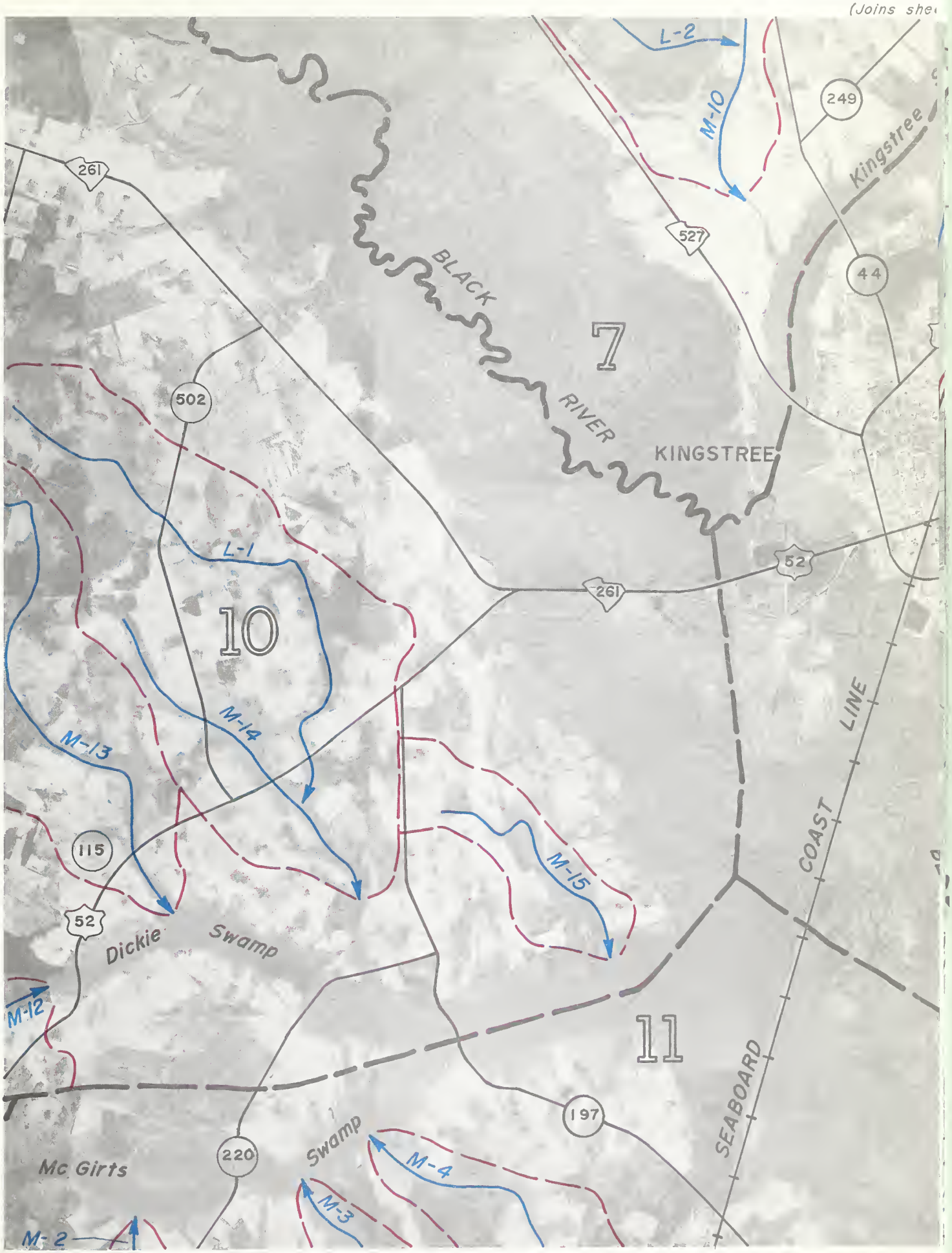
6

N

(Joins sheet 5)



0 1/2 1 Mile
Scale 1:50 000
(Approximate)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(Joins inset, sheet 5)

5

(Joins sheet 2)

(Joins sheet 9)

(Joins sheet 6)

N

0 1/2 1 Mile Scale 1:50 000 (Approximate) 0 5000 Feet

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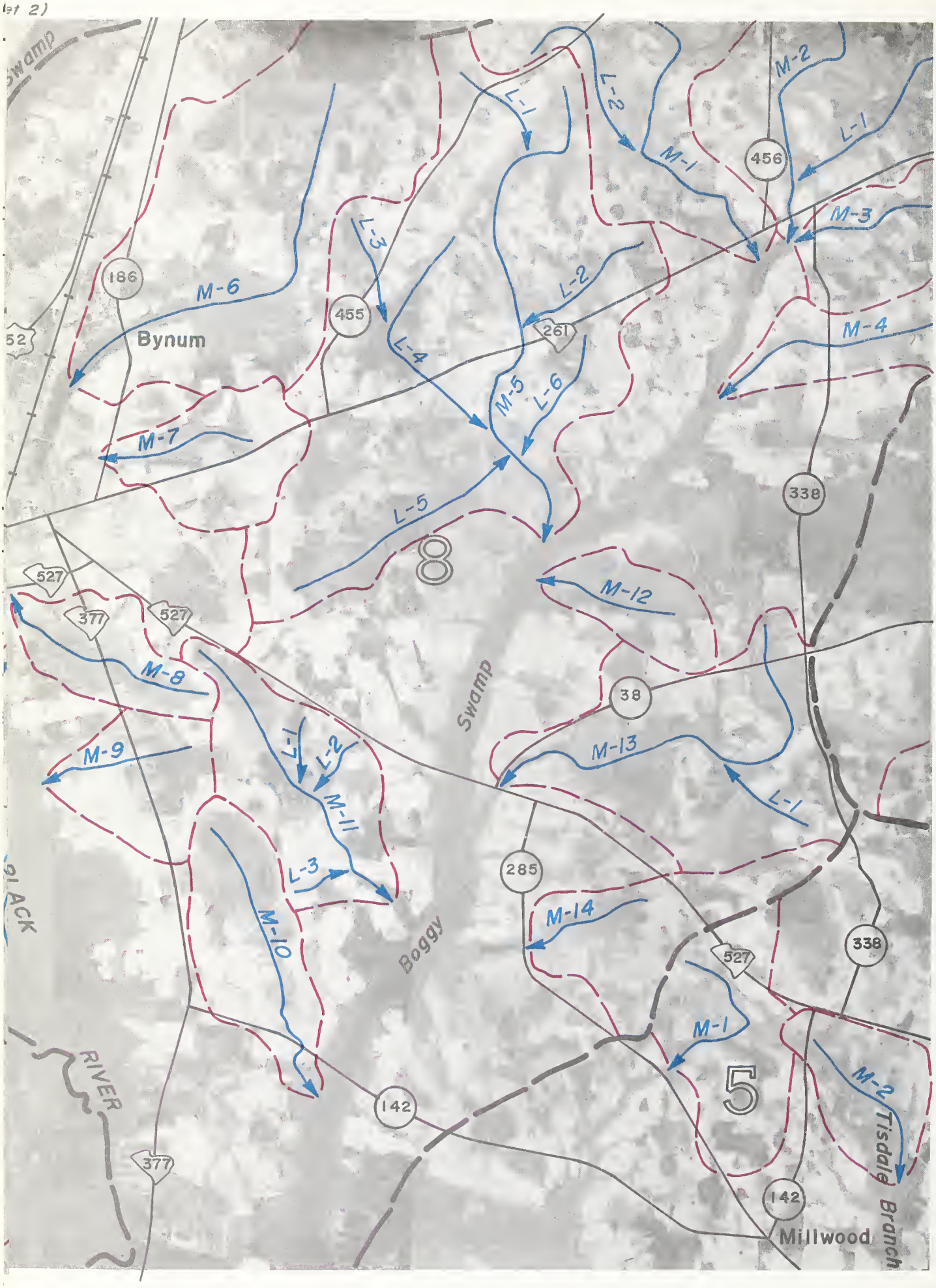
GE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(Sheet 2)

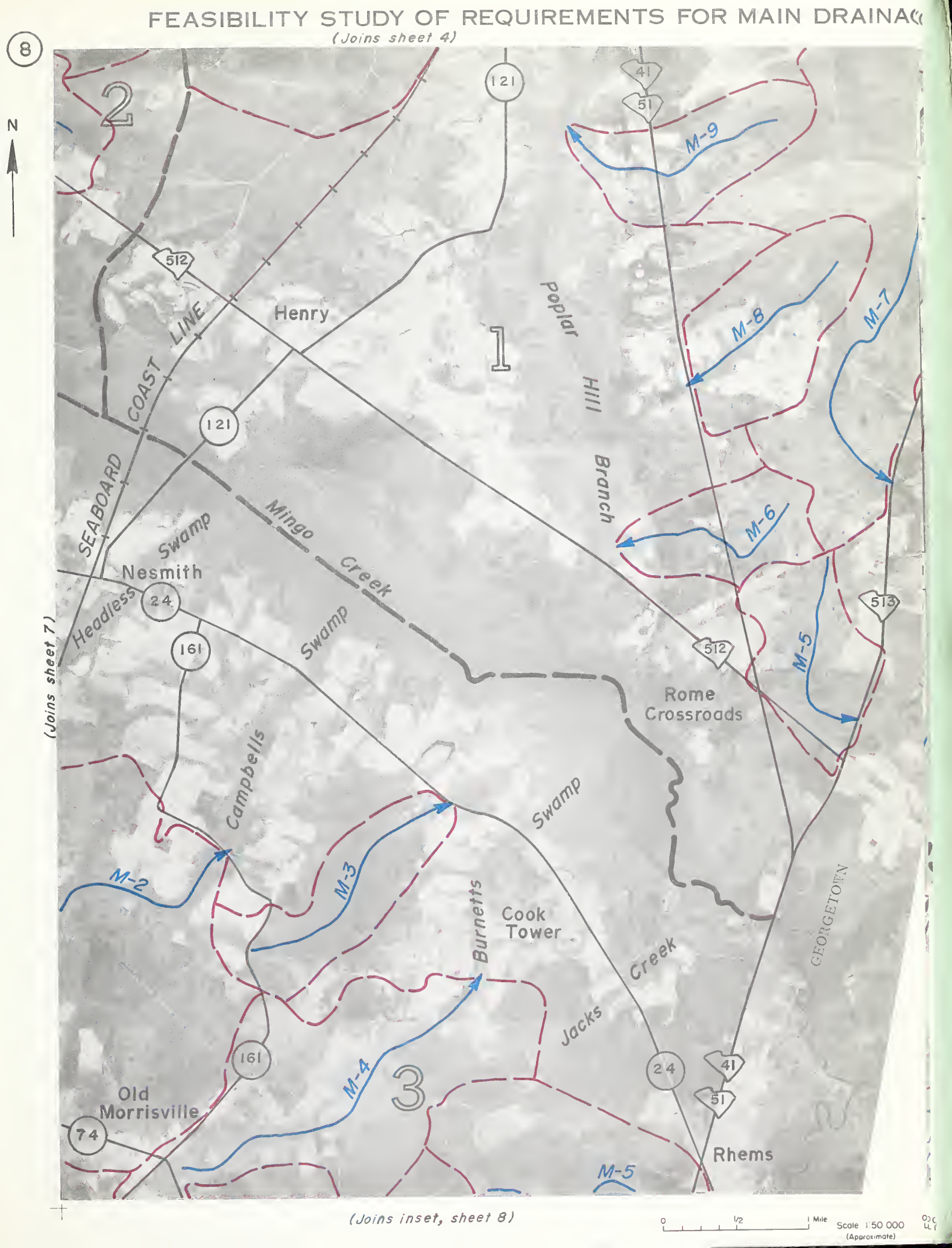


(Joins sheet 7)

(Joins sheet 10)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINA(

(Joins sheet 4)



FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

6

N

(Joins sheet 2)

L-2 M-10 249 Kingstree Swamp 527 44 52 186 M-6 Bynum 465 L-3 L-1 L-2 M-1 456 M-2 L-1 M-3 L-2 261 M-4 L-4 M-5 L-6 M-7 L-5 338

261 502 BLACK RIVER 7 KINGSTREE 52 627 377 527 8 M-12 38 M-13 L-1

L-1 10 M-13 M-14 M-8 M-9 L-1 L-2 M-11 L-3 M-10 Boggy Swamp

115 M-15 COAST LINE BLACK RIVER 285 M-14 338

52 Dickie Swamp M-12 11 SEABOARD 521 M-1 5 M-2 Tisdale Branch

197 220 Swamp M-4 M-3 M-2 Mc Girts 377 142 Millwood

(Joins sheet 5)

(Joins sheet 7)

0 ½ 1 Mile Scale 1:50 000 (Approximate) 0 5000 Feet

(Joins sheet 10)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(Joins sheet 3)

(Joins sheet 6)

(Joins sheet 8)

(Joins sheet 11)

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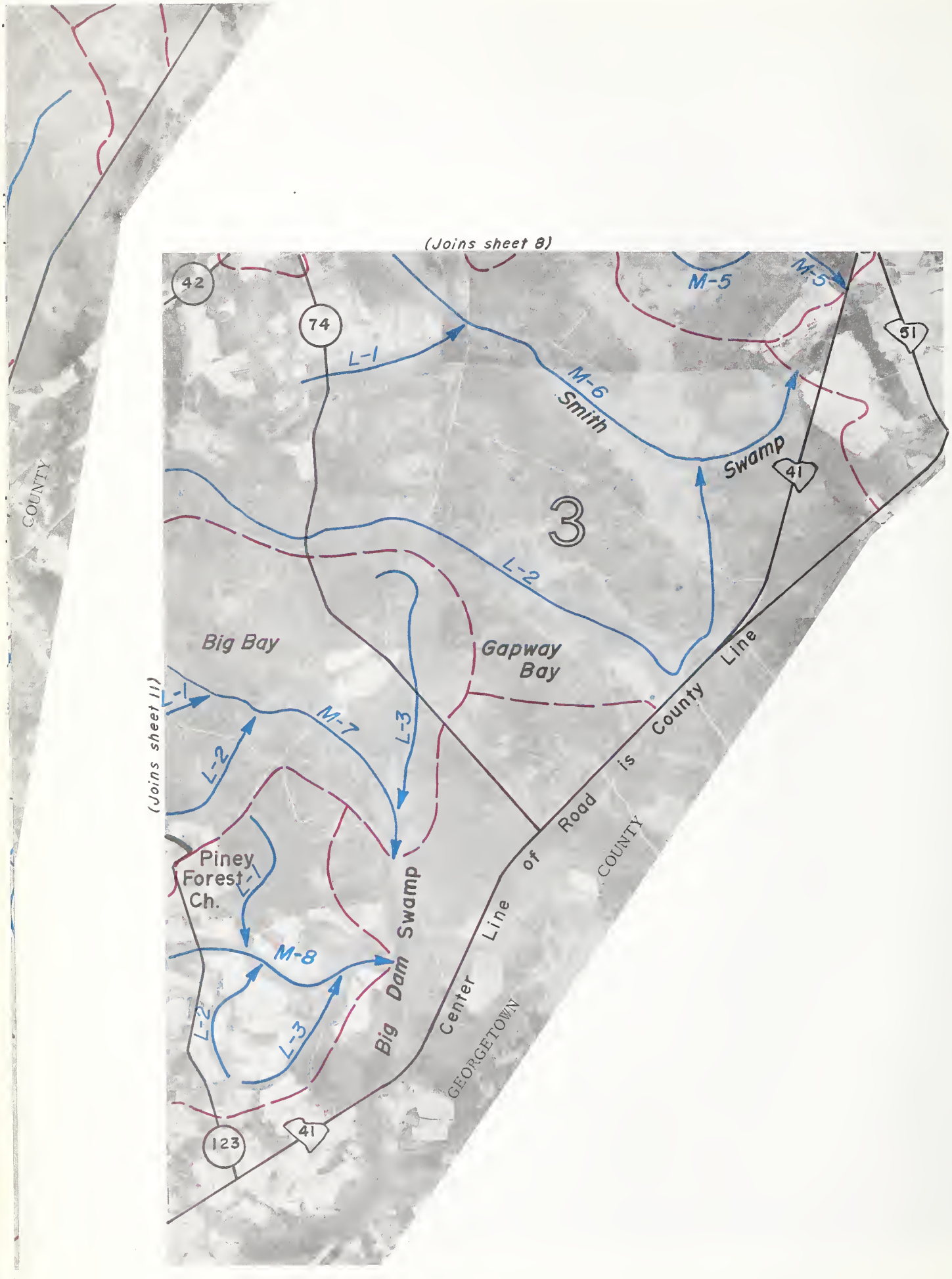
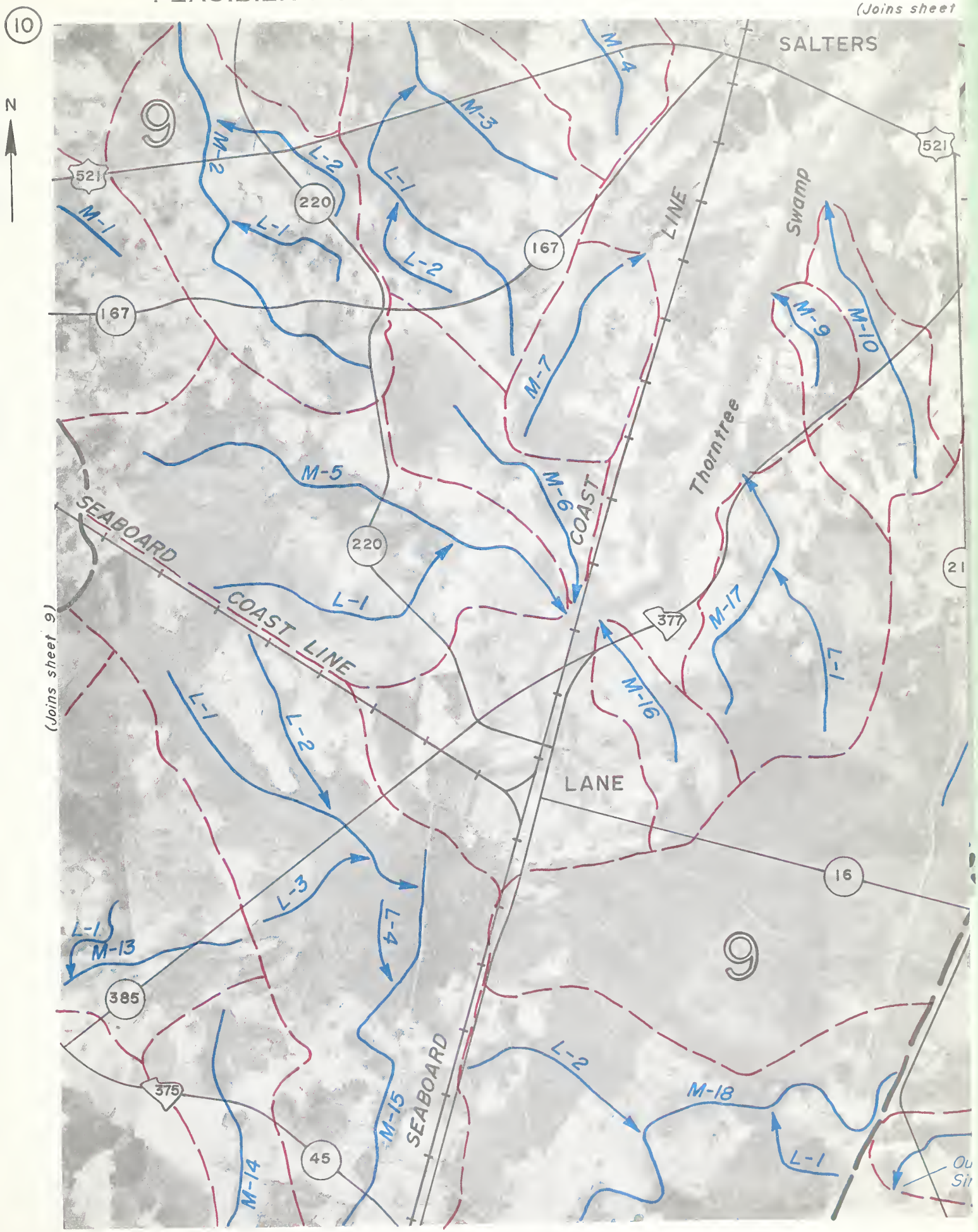


FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINA(

(Joins sheet



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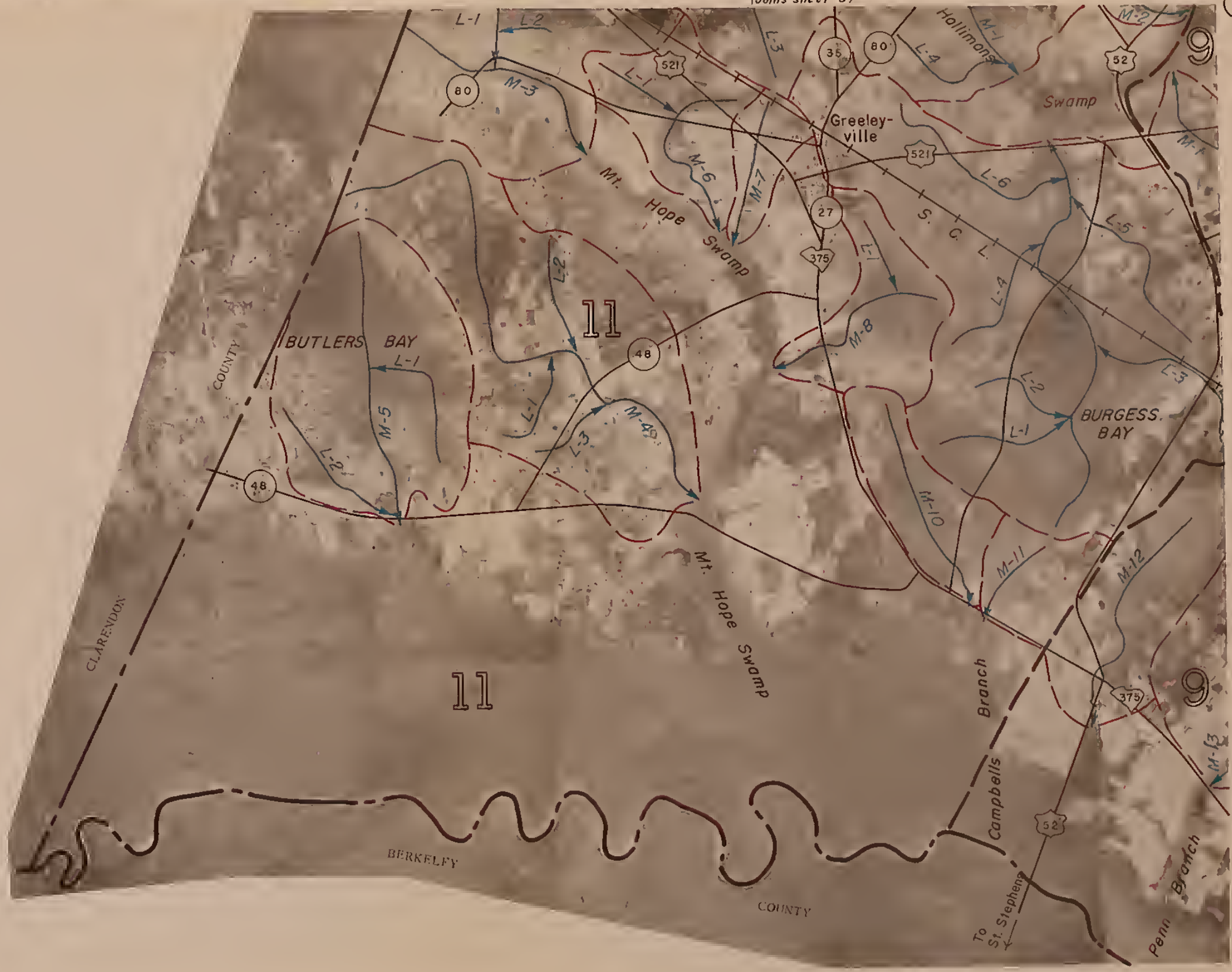

0 ½ 1 Mile Scale 1:50 000 (Approximate) 0 5000 Feet

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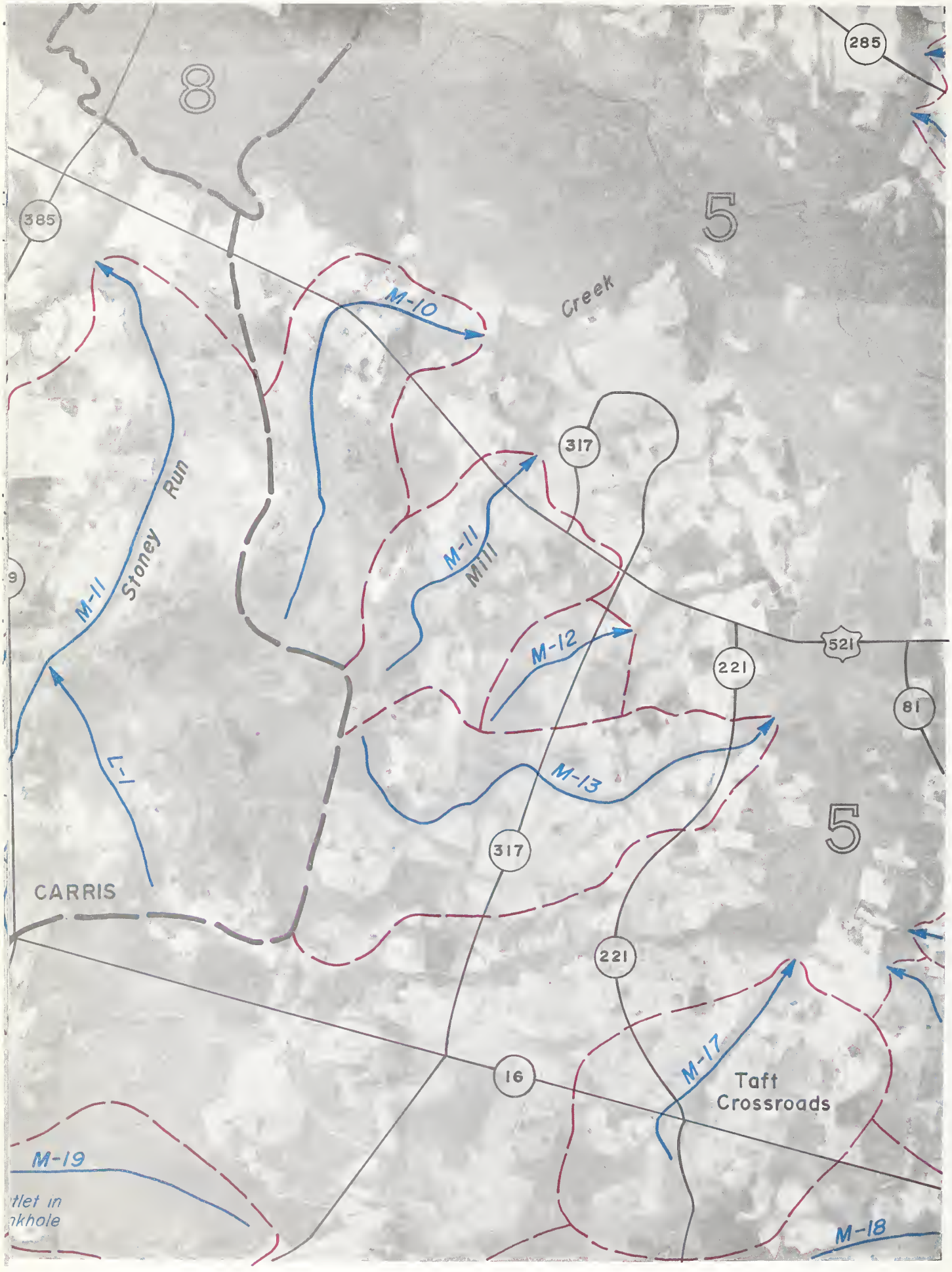
GE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(6)



(Joins sheet 11)

(Joins sheet 13)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINA

(12)

0 1/2 1 Mile
Scale 1:50 000
(Approximate)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(Joins sheet 6)

(10)

N

SALTERS

COAST LINE

Swamp

Thorntree

Stoney Run

Creek

LANE

CARRIS

SEABOARD

Taft Crossroads

Outlet in Sinkhole

9

8

5

M-1 M-2 M-3 M-4 M-5 M-6 M-7 M-9 M-10 M-11 M-12 M-13 M-14 M-15 M-16 M-17 M-18 M-19

L-1 L-2 L-3 L-4

521 220 167 385 219 377 285 317 221 81 16 45 315

(Joins sheet 9)

(Joins sheet 11)

(Joins sheet 12)

(Joins sheet 13)

Scale 1:50 000 (Approximate)

0 ½ Mile

0 5000 Feet

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(Joins sheet 7)

(Joins sheet 10)

(Joins sheet 8)

(Joins sheet 13)

Scale 1:50 000 (Approximate)

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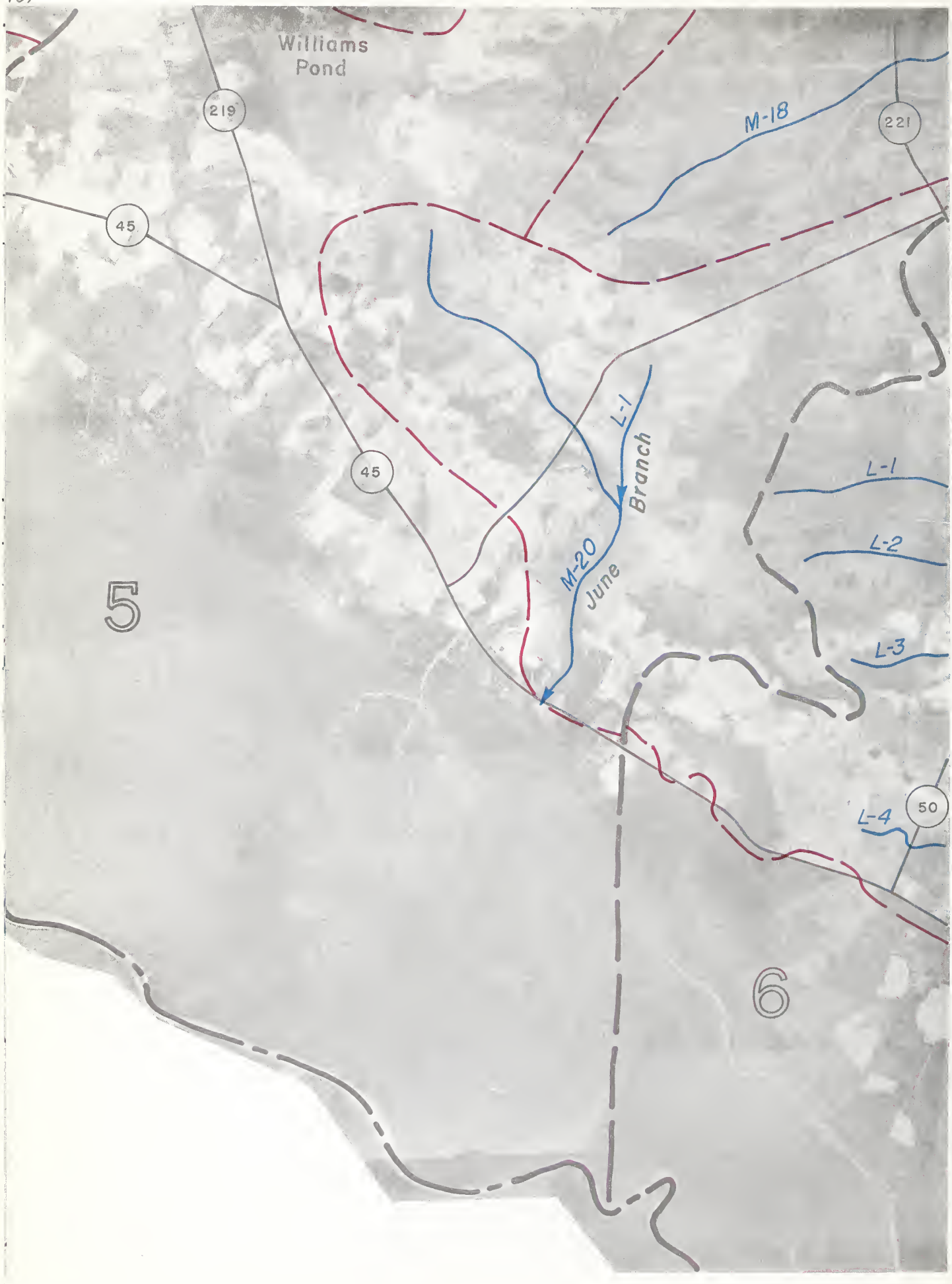
GE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(10)



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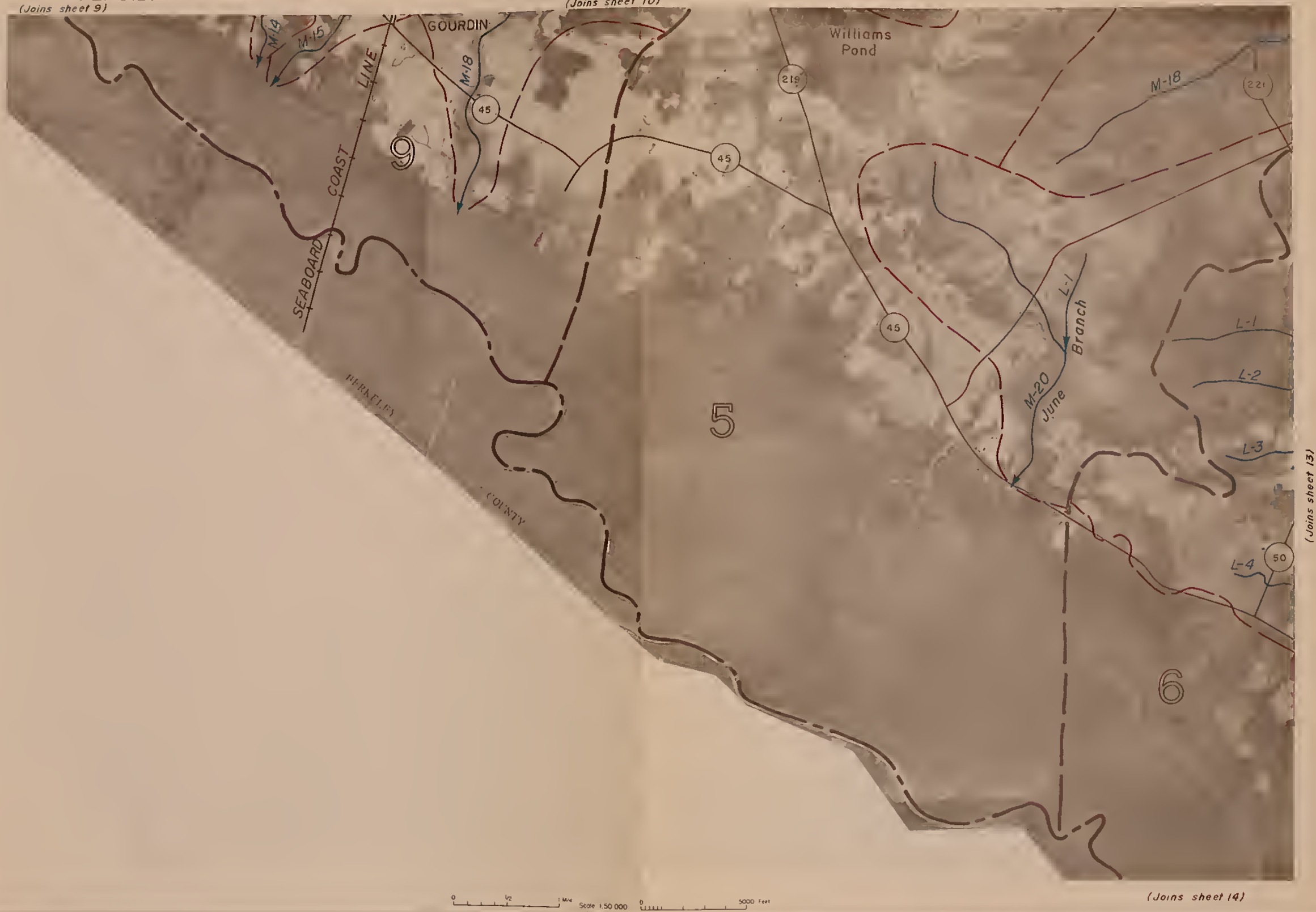
FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAG

(14)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA



FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN WILLIAMSBURG COUNTY, SOUTH CAROLINA

(Joins sheet 10)

(Joins sheet 11)

13

N

M-18

5

50

574

CAMP POND BAY

L-4

L-1

222

RICE FIELD BAY

L-2

50

L-1

Wee Tee Branch

WEE TEE BAY

L-2

L-3

M-12

(Joins sheet 12)

Earle Tower

M-9

Murray Swamp

122

M-8

Earle

222

L-1

Swamp

16

521

21

Flat Creek

M-9

223

ANDREWS

574

M-10

ALLIGATOR BAY

L-3

574

L-3

Johnsons

6

L-2

CEDAR CREEK BAY

6

OAK RIDGE BAY

M-11

41

122

495

L-5

M-13

L-1

Center Line of Road is County Line

GEORGETOWN

L-1

M-14

45

41

(Joins sheet 14)

0 ½ Mile Scale 1:50 000 (Approximate) 0 5000 Feet

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